U.S. Army Center for Health Promotion and Preventive Medicine

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TRAINING MUNITIONS HEALTH RISK ASSESSMENT
NO. 39-EJ-1485-00
RESIDENTIAL EXPOSURE FROM INHALATION OF
AIR EMISSIONS FROM THE
M855 5.56-MM TUNGSTEN BALL CARTRIDGE
DEPARTMENT OF DEFENSE IDENTIFICATION CODE: A059



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Readiness Thru Health

U.S. Army Center for Health Promotion and Preventive Medicine

The lineage of the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) can be traced back over 50 years. This organization began as the U.S. Army Industrial Hygiene Laboratory, established during the industrial buildup for World War II, under the direct supervision of the Army Surgeon General. Its original location was at the Johns Hopkins School of Hygiene and Public Health. Its mission was to conduct occupational health surveys and investigations within the Department of Defense's (DOD's) industrial production base. It was staffed with three personnel and had a limited annual operating budget of three thousand dollars.

Most recently, it became internationally known as the U.S. Army Environmental Hygiene Agency (AEHA). Its mission expanded to support worldwide preventive medicine programs of the Army, DOD, and other Federal agencies as directed by the Army Medical Command or the Office of The Surgeon General, through consultations, support services, investigations, on-site visits, and training.

On 1 August 1994, AEHA was redesignated the U.S. Army Center for Health Promotion and Preventive Medicine with a provisional status and a commanding general officer. On 1 October 1995, the nonprovisional status was approved with a mission of providing preventive medicine and health promotion leadership, direction, and services for America's Army.

The organization's quest has always been one of excellence and the provision of quality service. Today, its goal is to be an established world-class center of excellence for achieving and maintaining a fit, healthy, and ready force. To achieve that end, the CHPPM holds firmly to its values which are steeped in rich military heritage:

- ★ Integrity is the foundation
 - ★ Excellence is the standard
 - **★** Customer satisfaction is the focus
 - ★ Its people are the most valued resource
 - ★ Continuous quality improvement is the pathway

This organization stands on the threshold of even greater challenges and responsibilities. It has been reorganized and reengineered to support the Army of the future. The CHPPM now has three direct support activities located in Fort Meade, Maryland; Fort McPherson, Georgia; and Fitzsimons Army Medical Center, Aurora, Colorado; to provide responsive regional health promotion and preventive medicine support across the U.S. There are also two CHPPM overseas commands in Landstuhl, Germany and Camp Zama, Japan who contribute to the success of CHPPM's increasing global mission. As CHPPM moves into the 21st Century, new programs relating to fitness, health promotion, wellness, and disease surveillance are being added. As always, CHPPM stands firm in its commitment to Army readiness. It is an organization proud of its fine history, yet equally excited about its challenging future.

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TRAINING MUNITIONS HEALTH RISK ASSESSMENT NO. 39-EJ-1485-00 RESIDENTIAL EXPOSURE FROM INHALATION OF AIR EMISSIONS FROM THE M855 5.56-MM TUNGSTEN BALL CARTRIDGE

EXECUTIVE SUMMARY

This assessment evaluated the potential for human health effects to offsite residents breathing air emissions following use of the M855 5.56-mm Tungsten Ball Cartridge (Tungsten M855) on firing ranges during training exercises.

To conduct this study, air emissions from the Tungsten M855 were collected in a test chamber at the U.S. Army Aberdeen Test Center, Maryland. The data collected from the Firing Point Emission Study provided the amount and types of substances released from the Tungsten M855. This information was then used in an air dispersion model to determine ambient air concentrations at locations downwind from the Tungsten M855 firing location. Since the training facility in this study is hypothetical, the air model used assumptions that provided conservative estimates of air concentrations.

Modeled air concentrations were combined with exposure information (e.g., number of cartridges used per year) to estimate the amount of each substance the hypothetical resident breathes. This estimate was then compared with the substance's health-based screening level, which was obtained from agencies such as the U.S. Environmental Protection Agency, to determine if there is a potential for health risks from inhalation.

The health risk study included both long-term (30 years) and short-term (15-minute or 1-hour) exposures to modeled substance concentrations. Study results, generated using conservative methods, showed that the hypothetical offsite resident breathing air as close as 300 meters (984 feet) from the firing location is safe from these emissions. At locations closer than 300 meters from the firing location, a more site-specific evaluation is necessary. It should be noted that at most training installations, training areas are over 1,000 meters (over half a mile) away from populated areas.

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LIST OF ACRONYMS

AEC U.S. Army Environmental Center

AEGL Acute Exposure Guideline Levels

AIHA American Industrial Hygiene Association

Al Aluminum

ATC U.S. Army Aberdeen Test Center

ATV Acute Toxicity Value

DODIC Department of Defense Identification Code

DOE U.S. Department of Energy

EPA U.S. Environmental Protection Agency

ERPG Emergency Response Planning Guidelines

HBSL Health-Based Screening Level

INPUFF Integrated PUFF Model

NAAQS National Ambient Air Quality Standards

NEW Net Explosive Weight

NH₃ Ammonia

OEL Occupational Exposure Limit

PM₁₀ Particulate Matter under 10 microns in size

PRG Preliminary Remediation Goals

RBC Risk-Based Concentration

RfC Reference Concentration

TEEL Temporary Emergency Exposure Limits

TPH Total Petroleum Hydrocarbons

TSP Total Suspended Particulates

USACHPPM U.S. Army Center for Health Promotion and Preventive Medicine

TRAINING MUNITIONS HEALTH RISK ASSESSMENT NO. 39-EJ-1485-00 RESIDENTIAL EXPOSURE FROM INHALATION OF AIR EMISSIONS FROM THE M855 5.56-MM TUNGSTEN BALL CARTRIDGE

1. PURPOSE

This document presents the assessment of the potential for human health effects to offsite residents breathing air emissions following use of the M855 5.56-mm Tungsten Ball Cartridge (Tungsten M855) on firing ranges during training exercises.

2. AUTHORITY

Statement of Work, 30 November 2000, Training Munitions Inhalation Health Risk Evaluations.

3. REFERENCES

See Appendix A for a list of references.

4. BACKGROUND

4.1 CARTRIDGES AND THEIR USE

Cartridges are cases that contain a primer, propelling charge, and projectile. The primer is needed to activate the propelling charge, which provides the force to send the projectile to a target. Examples of projectiles include bullets, rockets, and missiles. Cartridges are also referred to as "rounds" and are fired from weapons such as pistols or rifles.

4.2 WHAT IS THE TUNGSTEN M855?

The Tungsten M855 is a type of ball ammunition, which means that it is intended for use against unarmored targets. This cartridge is used on firing ranges during training. Each cartridge is about as long as a man's thumb and weighs about as much as a half dollar coin. It can be identified by its green tip (Reference 1).

The Tungsten M855 is a variation of the original M855 and came into production in 1999. The difference between the two different M855 versions is the bullet composition. The Tungsten M855 bullet consists of a copper alloy jacket with tungstentin or tungsten-nylon whereas the original M855 bullet consists of a copper alloy jacket with a steel penetrator and a lead-antimony slug. The Tungsten M855 was developed to mitigate lead contamination problems on training ranges while maintaining the combat effectiveness of the earlier version.

4.3 USE OF THE TUNGSTEN M855

The Tungsten M855 is typically fired from the M249 machine gun or the M16A2 rifle (Reference 2). Training with the Tungsten M855 is very important because it allows our troops to practice using weapons and prepare them for combat situations. In addition, the Tungsten M855 bullet is free of lead and therefore reduces lead contamination of training ranges.

4.4 ASSESSMENT SUMMARY

The general assessment approach consisted of two main parts: air dispersion modeling and exposure assessment, which are briefly discussed in the paragraphs below. Sections 5 through 7 present a discussion of the methodology used for this study.

Emissions data used in the air dispersion modeling were obtained from the Firing Point Emission Study, conducted by the U.S. Army Aberdeen Test Center (ATC), at Aberdeen Proving Ground, Maryland (Reference 3). This study was funded by the U.S. Army Environmental Center (AEC) with the purpose of identifying and quantifying emissions from weapons firing. Data from this study were generated by firing munitions in a test chamber using weapons that are representative of those used by the U.S. Army during training operations. Emissions data for the Tungsten M855 were generated by firing it from the M16A2 rifle.

The emissions data for the Tungsten M855 were used with an atmospheric dispersion model to estimate the average concentrations that might be experienced by an offsite resident. Since this study is designed to provide results that would be applicable to most Army training facilities, the training area used in this assessment was a hypothetical one. While most training areas are at least 1,000 meters away from populated areas, as a conservative distance, it was initially assumed that a person could reside 100 meters downwind from the firing point (location where the rifle is positioned). In addition, air-modeling parameters were selected to mimic worst-case conditions.

The exposure assessment included calculations of time-averaged concentrations for both long-term (chronic) and short-term (acute) exposures. For the purpose of this study, air concentrations were averaged over 30 years for chronic exposures and 1-hour or 15 minutes for acute exposures. Using a screening approach, a substance's estimated time-averaged air concentration was then compared to chronic health-based screening levels (HBSLs) established by the U.S. Environmental Protection Agency (EPA) or acute toxicity values (ATVs) established by selected agencies depending on the exposure duration (i.e., 30 years versus 1-hour or 15 minutes). The comparison was made using the ratio of the HBSL or ATV to the estimated air concentration for each of the substances evaluated. If this ratio was less than one, no further evaluation was required. This approach is conservative because the exposure assumptions used

by the agencies, to establish HBSLs and ATVs, are likely to overestimate the exposures experienced by offsite residents living near firing ranges. If the chronic or acute averaged concentrations (C_{chronic} and C_{acute}) were greater than the screening levels, producing a ratio greater than one, further evaluation would be warranted to determine the potential for health effects. Note that concentrations greater than the screening levels do not indicate an onset of health effects, but rather, the potential for such.

5. DATA COLLECTION AND AIR MODELING

5.1 EMISSION FACTORS

Emission factors, used to derive the air modeling emission rates used in this study, were generated from the Firing Point Emission Study conducted by the ATC (Reference 3). The data included the net explosive weight (NEW), the substances sampled, and substance-specific emission factors. Emissions data from the Firing Point Emission Study are included in the first five columns of the table located in Appendix B.

5.2 BACKGROUND AND DESCRIPTION

Air dispersion models are available to mathematically simulate plume behavior and to estimate downwind concentrations of substances emitted from various sources. However, specific models are not available to determine the dispersion of emissions from munitions used during training. Estimating the magnitude and location of these concentrations depends on many factors including the amount and type of emissions, the behavior of the source, and meteorological conditions. Since a specific model is not available for modeling the use of munitions during training, the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) evaluated numerous air models to determine which would be suitable for use with munitions used during training. The USACHPPM recommended using the Integrated PUFF (INPUFF) model to estimate the dispersion of emissions from various munitions sources (Reference 4).

The INPUFF Model (Reference 5) was developed to simulate dispersion from instantaneous or semi-continuous point sources. This Gaussian-integrated puff model is capable of addressing a cloud type release over short periods of time, and computations can be performed for a single point source for multiple receptors. The algorithms used to calculate concentrations assume a vertically uniform wind direction (with no chemical reaction) to compute the contribution of each cloud at a receptor for each time step/interval.

5.3 MODEL ASSUMPTIONS

Some assumptions were made to best represent the firing of the Tungsten M855 cartridges. These assumptions were as follows:

> Typically, with conventional point sources (such as incinerators), the cloud rise and formation are determined by characterizing flue gas exit velocity,

temperature, and stack diameter. However, the M855 cartridges are used in conjunction with machine guns and rifles. For unconventional sources with no real physical stack dimensions, such as rifles, the stack height and diameter were assumed to be equal to the height of the barrel and the bore diameter. No exit velocity was used with this source because the emission rates generated from the test data were obtained from sampling a stabilized cloud with no exit velocity. Table 1 includes the source parameters used to model the Tungsten M855 cartridges.

TABLE 1: SOURCE PARAMETERS

Parameter	Model Input
Source/Stack Diameter	0.00556 meters
Source/Stack Height	1 meter
Source Exit Temperature	298.15 degrees Kelvin (°K) (or 77 °F)
Exit Velocity	0 meters/second
Initial horizontal dispersion coefficient (σ_y)	2.29 meters
Initial vertical dispersion coefficient (σ_z)	1.07 meters

- Initial cloud dimensions are preferred to model the air emissions from these types of releases. Typically, these dimensions are used to define the initial horizontal and vertical dispersion values (σ_y and σ_z) of the released cloud. However, this information was not measured during the studies at the ATC; therefore, the cloud dimensions were based on the test chamber dimensions and the volume of air sampled. By assuming an elliptical cloud with the prevailing wind direction being perpendicular to the muzzle when fired, the test chamber's radius would be equal to the initial vertical dispersion (σ_z), and the initial horizontal dispersion (σ_y), would be equal to one half the length of the test chamber. The cloud exit temperature was assumed to be equal to the test chamber temperature.
- ➤ For the purposes of this study, a hypothetical offsite resident was assumed to be located first at 100 meters, then at 200 and 300 meters directly downwind from the source. The meander of the cloud is a major factor when estimating concentrations at given locations downwind from the source. Assuming that the resident is directly downwind from the source is the same as assuming that there is no cloud meander and that the center of the cloud migrates directly over the hypothetical offsite resident. This assumption provides the most conservative modeled concentrations.
- ➤ Since this study does not look at a specific training site, generic, worst-case meteorological data were used. To determine the worst-case meteorological conditions that would result in the highest ambient air concentrations, the modeling was performed using the EPA Risk Management Program Guidance (Reference 6). This guidance includes tables for estimating the footprint of

chemical releases and is intended to inform emergency responders of potential accidental releases. The EPA has defined most default conditions for meteorological modeling parameters. Table 2 lists the meteorological parameters that were used in the air model.

TABLE 2: WORST-CASE METEOROLOGICAL PARAMETERS

Parameter	Input Value
Wind Speed	1 meter/second
Atmospheric Stability	Category F
Wind Direction	270°
Ambient Temperature	293 degrees Kelvin (°K) (or 68 °F)

5.4 GENERAL METHODOLOGY

The model was run for a total calculation time of 200 seconds for the 100-meter location and 400 seconds for the 200 and 300-meter locations. This was done to simulate a single round being fired and to ensure that the total mass of the cloud had passed the hypothetical resident locations. Concentrations were calculated every 2 or 4 seconds, depending on the location being modeled. The model results indicated that the initial cloud reached the hypothetical offsite resident at 300 meters within 242 seconds and dissipated below the lowest concentration the model calculated (1 x 10^{-12} g/m³) within 394 seconds. Table 3 contains the air model input parameters used in this study.

TABLE 3: AIR MODEL INPUT PARAMETERS

Parameter	Input Value		
i alametei	100 meters	200 meters	300 meters
Number of meteorological periods (NTIME)	1	1	1
Duration of each meteorological period (ITIME)	200 seconds	400 seconds	400 seconds
Number of updates to the source (NSRCDS)	100	100	100
Duration/time step between each source update (ISUPDT)	2 seconds	4 seconds	4 seconds
Total time modeled/Simulation Period (NTIME) (ITIME)= (NSRCDS) (ISUPDT)	200 seconds	400 seconds	400 seconds

5.5 USE OF MODEL OUTPUT

The concentrations provided by the INPUFF model were based on a unit emission rate (ER_{unit}) of 1 gram/second from an emission source, and did not represent any substance-specific concentrations from the use of any weapons system. This unit emission rate is typically used for ease of modeling purposes. The relationship between the emission rate and predicted concentration is linear. Therefore, the ratio of the

predicted concentration to the unit emission rate was multiplied by each substancespecific emission rate to provide substance-specific concentrations.

5.6 DETERMINATION OF SUBSTANCE-SPECIFIC EMISSION RATES

The actual substance emission rate for one item (ER₁) for each substance was calculated using Equation 1. Example 1 contains a sample calculation using this equation.

$$ER_1 = \frac{EF \cdot CV}{t}$$
 Equation 1

Where:

 ER_1 = emission rate for one item ((g/item)/sec)

EF = average adjusted emission factor (lb/item)

CV = conversion factor (453.59 g/lb)

t = release duration obtained from the INPUFF model (sec)

Example 1 Sample Calculation Using Equation 1:

$$\mathsf{ER}_1 = \frac{(2.48 \, \mathsf{E} - 05) \, (453.59)}{(4)}$$

= 2.808 E-03 g/sec

Calculation provided for ammonia (NH₃) at the 300-meter location. Appendix B provides the average adjusted emission factor of NH₃ in lb/item.

Substance-specific ambient concentrations for one item (CONC) were calculated using Equation 2. A sample calculation using this equation is provided in Example 2. Appendix B contains the estimated air concentrations for the 100, 200, and 300-meter locations.

$$CONC = ER_1 \cdot \frac{UC}{ER_{unit}}$$
 Equation 2

Where:

CONC = substance concentration based on one item (g/m³)

 ER_1 = emission rate for one item (g/sec)

 ER_{unit} = unit emission rate as used in the model (g/sec)

UC = concentration based on the unit emission rate (g/m^3)

Example 2 Sample Calculation Using Equation 2:

 $= 1.189E-07 \text{ g/m}^3$

$$CONC = (2.808E - 03) \frac{(4.236E - 05)}{(1)}$$

Calculation provided for NH₃ at the 300-meter location.

RISK ASSESSMENT

6.1 EXPOSURE ASSUMPTIONS

Exposure assumptions for the Tungsten M855 were selected using a typical use scenario for the original M855 during training exercises. It was assumed that the Tungsten M855 would be used in the same manner as the original M855. The typical use scenario was provided by the AEC and is based on consultation with their senior training advisor (References 7, 8). The frequency of use for the Tungsten M855 was required to determine how much substance an offsite resident would be exposed to in the time period of interest (i.e., acute or chronic exposure). Table 4 summarizes the general use scenario for the Tungsten M855.

TABLE 4: FREQUENCY OF USE FOR THE TUNGSTEN M855

Parameter	Value Used
Number of cartridges used per year	1,440,622
Maximum number of cartridges used in one hour	1,000

6.2 TIME-AVERAGING

For the chronic assessment, time-averaged concentrations were calculated by assuming that the hypothetical resident would be exposed for 30 years. This is consistent with the exposure duration used by the EPA, which assumes that the resident spends 30 years at the same residence. By using the same exposure duration, the estimated time-averaged concentrations were compared with the selected HBSLs, which were derived using standard EPA default assumptions.

Using the default residence time established by the EPA, the assumption was made that someone could be exposed to emissions from 1,440,622 cartridges per year for 30 years. Table 5 lists the exposure parameters used to estimate concentrations for the chronic assessment. These parameters are based on the typical use scenario provided by the AEC (Table 4) and the assumptions used in the air model run.

TABLE 5: EXPOSURE PARAMETERS USED TO DETERMINE TIME-AVERAGED CHRONIC AIR CONCENTRATIONS

Exposure Parameter	Value Used			
Exposure Parameter	100 meters	200 meters	300 meters	
Exposure Time (ET _{cta})	3.33	6.67	6.67	
Lxposure Time (LTctg)	min/cartridge ¹	min/cartridge ¹	min/cartridge ¹	
Exposure Frequency (EF _{ctg})	1,440,622 cartridges/year			
Exposure Duration (ED)	30 years ²			

¹Based on the total model time of 200 seconds (3.33 minutes) or 400 seconds (6.67 minutes) used in the air model run. Refer to Table 3 for the Air Model Input Parameters. ²EPA default value.

Chronic averaged concentrations were calculated using Equation 3. Example 3 shows how this calculation was performed using the total suspended particulates (TSP) concentration at 300 meters as an example. Since TSP is classified as a noncarcinogen, the averaging time (AT) is the same as the exposure duration.

$$C_{chronic} = \frac{CONC \cdot 10^6 \cdot ET_{ctg} \cdot EF_{ctg} \cdot ED}{525,600 \cdot AT}$$
 Equation 3

Where:

 $C_{chronic}$ = average chronic concentration (μ g/m³)

CONC = average modeled concentration for one cartridge (g/m³)

 10^6 = unit conversion (µg/g)

 ET_{ctg} = exposure time per cartridge (minutes/cartridge) EF_{ctg} = exposure frequency per year (cartridges/year)

ED = exposure duration (years) 525,600 = unit conversion (minutes/year)

AT = averaging time (years)

(carcinogenic endpoint: AT = 70 years noncarcinogenic endpoint: AT = ED)

Example 3 Sample Calculation Using Equation 3:

$$C_{chronic(TSP)} = \frac{(2.117 \text{E} - 07)(10^6)(6.667)(1,440,622)(30)}{(525,600)(30)}$$

$$= 3.87E+00 \mu g/m^3$$

Appendix B provides the average modeled concentration for one cartridge (CONC). Table 5 includes the exposure parameters.

Unlike the chronic assessment, only limited guidance for evaluating acute exposures is currently available. Since many cartridges may be fired in a short period of time, however, acute exposures cannot be overlooked. For the purpose of this study, acute exposure is defined as a 1-hour or 15-minute exposure. The 1-hour or 15-minute acute exposure averaging times allow for comparison with guidelines developed specifically for emergency planning purposes (refer to the discussion on acute toxicity below).

The exposure frequency is based on the number of cartridges used per 1-hour or 15 minutes depending on the guideline used for comparison. This information is based on the use scenario provided in Table 4. To estimate air concentrations for potential acute health effects, it was conservatively assumed that 1,000 Tungsten M855s are fired in one hour. The average acute concentrations were computed using Equation 4. Example 4 contains a sample calculation at 300 meters using this equation. Since TSP does not have an ATV, aluminum (AI) is used as the example substance.

$$C_{acute} = \frac{CONC \cdot 10^6 \cdot ET_{ctg} \cdot EF_{ctg}}{60}$$
 Equation 4

Where:

 C_{acute} = average acute concentration ($\mu g/m^3$)

CONC = average modeled concentration for one cartridge (g/m³)

 10^6 = unit conversion (µg/g)

ET_{ctq} = exposure time per cartridge (minutes/cartridge)

 EF_{cta} = exposure frequency (cartridges/hour)*

= unit conversion (minutes/hour)

* Based on 1-hour or 15 minute (0.25 hour) ATV

Example 4 Sample Calculation Using Equation 4:

$$C_{acute(Al)} = \frac{(1.087E - 09)(10^6)(6.667)(1,000/0.25)}{60}$$
$$= 4.83E-01 \ \mu g/m^3$$

Appendix B provides the average modeled concentration for one cartridge (CONC) for Al.

6.3 TOXICITY ASSESSMENT

The potential for health effects was determined by comparing time-averaged air concentrations to HBSLs and ATVs, which are developed from a substance's known toxicity. These toxicity values typically include different levels of safety factors depending on the level of confidence of the critical study. Appendix C contains a table of screening toxicity values used for the chronic and acute assessments.

6.3.1 CHRONIC ASSESSMENT

The chronic assessment was evaluated using a screening approach. Using this method, a substance's estimated time-averaged air concentration was compared to its HBSL by using the ratio of the HBSL to the estimated concentration. If this ratio was less than one, no further evaluation was necessary. This approach is conservative because the exposure assumptions used by the EPA, to establish HBSLs, assume that the resident is continuously exposed for 350 days per year (assuming 2 weeks vacation per year). In contrast, exposure to air emissions from actual training activities at a firing range is intermittent and is not likely to occur on a daily basis year round.

A hierarchy of sources was developed for selection of the HBSLs to quantitatively evaluate as many of the identified substances as possible. The hierarchy of sources used was as follows:

- Clean Air Act, EPA National Ambient Air Quality Standards (NAAQS) (Reference 11)
- > EPA Region 9 Preliminary Remediation Goals (PRGs) (Reference 10)
- > EPA Region 3 Risk-Based Concentrations (RBCs) (Reference 9)

Some substances have neither PRGs nor RBCs because they have their own set of regulatory standards. Under the Clean Air Act, the EPA is required to establish NAAQS for several substances considered harmful to public health and the

environment. Currently, NAAQS are available for seven substances. The NAAQS for the longer averaging time were used for the chronic assessment. Depending on the substance, this can range from an 8-hour average to an annual average. In addition, since the majority of the measured TSP was PM_{10} (particulate matter under 10 microns in size) (Reference 3), the NAAQS for PM_{10} was used to evaluate the potential for health effects from exposure to TSP.

Next on the hierarchy, after the NAAQS, are the EPA Region 9 PRGs and the EPA Region 3 RBCs. The methodology used by EPA Region 9 to develop the PRGs generally results in lower values than the EPA Region 3 RBCs. However, there were occasions when the RBCs were lower than the PRGs. To maintain a conservative approach for this study, the lower of the two values from these sources was selected as the HBSL for each substance evaluated. If only one value was available from these sources then it was selected as the HBSL. To ensure that the most recent information was used, the Internet sites of both EPA Regions were checked. The HBSLs used for this assessment are presented in Appendix C.

Although the general approach used by both EPA Region 3 and Region 9 is the same, the exposure assumptions differ enough so that final recommended values can vary to a certain degree. In both methods, a substance's screening concentration was selected using the toxicity endpoint that derives a lower concentration. For example, if a substance has a known systemic toxicity and is a carcinogen, the screening concentration was calculated using both toxicity values. To maintain a conservative approach, EPA then selected the lower screening concentration as the recommended PRG or RBC.

Example 5 shows a sample calculation of how a substance's estimated chronic concentration was compared to its HBSL using the TSP concentration at 300 meters.

Example 5 Sample Calculation Comparing a Substance's Estimated Chronic Concentration to Its HBSL:

$$\frac{C_{chronic(TSP)}}{HBSL} = \frac{3.87E + 00}{5.00E + 01}$$
$$= 7.74E - 02 < 1$$

In this case, the resulting ratio is less than one, indicating further evaluation is not necessary.

Many petroleum hydrocarbons were detected but do not have specific screening levels. Therefore, the approach recommended by the Total Petroleum Hydrocarbon Criteria Working Group (Reference 12) was adopted to evaluate petroleum hydrocarbon mixtures. Based on the working group's assessment of various hydrocarbons, it was recommended that mixtures be separated according to a

substance's number of carbons and its chemical class (i.e., aliphatic or aromatic¹). Generally, as a substance's carbon number increases, its molecular weight increases, and it is, therefore, not a substance of concern via inhalation. The working group also concluded that aromatic hydrocarbons tend to be more toxic than aliphatic hydrocarbons (Reference 12). Table 6 presents the inhalation toxicity values used to evaluate exposure to petroleum mixtures. To be consistent with the methodology used in this study, the reference concentrations (RfCs) were converted to PRGs using EPA Region 9 exposure assumptions. The resulting PRGs were used as the HBSLs for the petroleum hydrocarbons in this assessment. These values are presented in Appendix D.

TABLE 6: SUMMARY OF RfCs USED FOR PETROLEUM HYDROCARBONS¹

Carbon Range	Aromatic Inhalation RfC (mg/m³)	Aliphatic Inhalation RfC (mg/m³)
C ₅ – C ₆ C _{>6} – C ₈		18.4
C>7 - C8	0.4	
$C_{>8} - C_{10}$ $C_{>10} - C_{12}$ $C_{>12} - C_{16}$	0.2	1.0
$C_{>16} - C_{21}$ $C_{>21} - C_{35}$	NA	NA

Reference 12

NA = not applicable for high molecular weight TPHs (Total Petroleum Hydrocarbons) ($C_{>16}$) because substances in this carbon range are not volatile and therefore, inhalation is not a pathway of concern.

6.3.2 ACUTE ASSESSMENT

An established method for assessing acute health effects is not currently available. In 1995 the EPA recognized the need for acute exposure guidelines for emergency response purposes and created the National Advisory Committee for Acute Exposure Guideline Levels (AEGLs) for Hazardous Substances. Currently, AEGLs are available for only a few substances

To overcome the absence of acute toxicity data for the purposes of human health risk assessment, several state regulatory agencies have suggested that guidelines developed for emergency purposes be used in the interim. Although suggestions have been made to use occupational exposure limits (OELs) by applying additional safety factors (References 14,15), OELs were not used in this study because they introduce even more uncertainty than the use of emergency guidelines. The OELs

¹ Aliphatic hydrocarbons are hydrocarbons in which the carbon atoms are joined by single covalent bonds consisting of two shared electrons (e.g., butane). Aromatic hydrocarbons have ring structures (e.g., benzene) (Reference 13).

are designed to protect the workplace environment, and assume 8 hours a day, 5 days a week exposures. By definition, these exposures are more chronic than acute.

In comparison, emergency planning guidelines are more appropriate because they are typically developed for exposures of 1-hour or less. In addition, depending on the agency that develops these guidelines, safety factors are included as part of the guideline development, so that the values would be protective of the general population.

Emergency Response Planning Guidelines (ERPGs) published by the American Industrial Hygiene Association (AIHA) (Reference 16) and the Temporary Emergency Exposure Limits (TEELs) developed by the U.S. Department of Energy (DOE) (Reference 17) were used for this study, specifically the ERPG-1s and the TEEL-1s. Since TEEL-1s are intended for exposures up to 15-minutes, air concentrations compared to TEELs were averaged over a 15-minute period. Air concentrations compared to ERPGs and AEGLs were averaged over 1-hour as these values are intended for 1-hour exposures.

For this study, the hierarchy of sources for ATV selection was as follows with each ATV defined below:

- ➤ EPA AEGL-1. "AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic, nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure."
- ➤ AIHA ERPG-1. "The maximum concentration in air below which it is believed nearly all individuals could be exposed for up to one hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor."
- ➤ DOE TEEL-1. "The maximum concentration in air below which it is believed nearly all individuals could be exposed without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor."

AEGLs were used first when available since they are developed specifically for the purpose of acute exposure assessments. The ERPGs were selected next, prior to a substance's TEEL, because they are vigorously reviewed before they are published whereas the TEELs are not.

Example 6 shows a sample calculation of how a substance's estimated acute concentration was compared to its ATV using the aluminum concentration at 300 meters.

Example 6

Sample Calculation Comparing a Substance's Estimated Acute Concentration to Its ATV:

$$\frac{C_{acute(AI)}}{ATV} = \frac{4.83E - 01}{3.00E + 04}$$
$$= 1.61E - 05 < 1$$

In this example with AI, the ratio is less than one, indicating that further evaluation is not necessary.

7. RISK CHARACTERIZATION

As previously described, the exposure assessment included calculations of time-averaged concentrations for both long-term (chronic) and short-term (acute) exposures. Using a screening approach, a substance's estimated time-averaged air concentration was then compared to chronic HBSLs or ATVs. The comparison was made using the ratio of the HBSL or ATV to the estimated concentration. This approach is conservative because the exposure assumptions used by the EPA, to establish HBSLs and ATVs, are likely to overestimate the exposures experienced by offsite residents living near firing ranges.

If this ratio was less than one, no further evaluation was needed. If the chronic or acute averaged concentrations (C_{chronic} and C_{acute}) were greater than the screening levels, resulting in a ratio greater than one, further evaluation would be warranted to determine the potential for health effects. Note that concentrations greater than the screening levels do not indicate an onset of health effects, but rather, the potential for such.

The chronic and acute assessments were conducted as outlined in Section 6.3. Appendix D presents results from the Tungsten M855 risk characterization.

7.1 CHRONIC HEALTH RISK

The exposure assessment, at the 100-meter downwind hypothetical resident location, indicated that levels of hydrogen cyanide and lead from the Tungsten M855 emissions were greater than their screening levels. Estimated concentrations were remodeled to a distance 200 meters downwind from the firing location. The results showed that modeled concentration of hydrogen cyanide still exceeded its HBSL. However, the estimated lead concentration decreased to a level below its HBSL. When the modeled distance was further increased to 300 meters, the estimated concentration of hydrogen cyanide indicated a safe level. The ratios of all other substances to their HBSLs were below one.

At the 100-meter location, the ratio of estimated hydrogen cyanide concentrations to the HBSL was 3.00. Hydrogen cyanide is a colorless gas with a faint,

bitter, almond-like odor. It is naturally produced by some microorganisms and can be found in a number of foods and plants. Example uses of hydrogen cyanide in industry include chemical production, photographic development, and some mining processes. There are no reports that hydrogen cyanide causes cancer. Long-term inhalation of hydrogen cyanide may result in breathing difficulties, heart pains, vomiting, blood changes, headaches, and enlargement of the thyroid gland (Reference 18).

The ratio of estimated lead concentrations to the HBSL was 1.94 at the 100-meter location. Lead is a naturally occurring bluish-gray metal found in the earth's crust in small amounts. It is commonly used in the production of lead-acid batteries for automotive and industrial applications. Exposure to lead in the air primarily results from emissions from industrial processes. The main target for lead toxicity is the nervous system. Studies have shown that continual inhalation of lead may cause blood effects (Reference 19).

Again, it should be noted that an estimated concentration that is higher than the HBSL does not indicate an onset of health effects, but rather that further evaluation using site-specific data is necessary.

7.2 ACUTE HEALTH RISK

The outcome of the acute assessment indicated that no acute health effects are expected from breathing the air emissions from the Tungsten M855 at the 100-meter location. Since all ratios at the 100-meter location were below one, no further evaluation was needed. However, air concentrations were modeled at the 200- and 300-meter locations for consistency with the chronic assessment. The results of the acute assessment for the 200- and 300-meter locations were even lower than for the 100-meter location.

7.3 FACT SHEET

Appendix E includes a copy of the fact sheet submitted to the AEC. The fact sheet used results from this study to address health concerns related to inhalation of Tungsten M855 air emissions.

8. UNCERTAINTY DISCUSSION

The limitations inherent in modeling and the added conservatism of the assessment contribute to the uncertainty of the study results. The risk assessment methodology typically includes safety factors that are embedded in the toxicity data to ensure adequate protection of the general population, particularly, susceptible individuals such as the sick, elderly, and children. Table 7 identifies areas of uncertainty associated with this assessment.

TABLE 7: TYPES OF UNCERTAINTY

issue	Uncertainty	Direction of Effect			
	Emissions Modeling				
Modeled versus real- time sampling	The air concentrations in this study were modeled. Actual air concentrations taken from the field may be higher or lower.	Varies			
Frequency of use for the Tungsten M855	Actual frequency of use for these munitions during training exercises may be different from those stated in this report.	Varies			
Hypothetical resident assumed to be located directly downwind	Unless the area around the training facility is populated, the chances that a person living directly downwind is low.	Overestimates			
Use of worst-case meteorological conditions	To ensure that this study is applicable to most training areas, worst-case meteorological conditions were used in the air model.	Overestimates			
Exposure Assessment					
Comparing estimated concentrations to established screening levels	The EPA Region 3 and Region 9 HBSLs were developed assuming that the resident is exposed 350 days per year. It is unlikely for training with the Tungsten M855 to occur for 350 days per year at a particular firing range.	Overestimates			

TABLE 7: TYPES OF UNCERTAINTY

Issue	Uncertainty	Direction of Effect		
Estimating time- averaged concentrations	Actual exposure from the Tungsten M855 is intermittent. If one were to plot a person's exposure profile, the plot would consist of a series of spikes. Since current risk assessment methodology does not allow the evaluation of the potential for health effects as a function of time, a single concentration, averaged over the exposure duration was used. In this study, the exposure durations used were 30 years and 1-hour or 15 minutes.	Varies		
Comparing estimated concentrations to established screening levels	Comparison to screening levels does not account for possible cumulative effects of exposure to more than one substance.	Underestimates		
Screening assessment versus calculating an average daily intake	Calculating an average daily intake allows the use of scenario-specific assumptions. However, unless the ratio of concentration to screening level approaches one, a screening assessment is useful as a first-cut evaluation.	Varies		
Exposure to other munitions	Other munitions are typically used during the same training exercise. These items may contain similar or different substances from those detected in the Tungsten M855 emissions.	Underestimates		
Toxicity Assessment				
Lack of toxicity data	Some substances were not quantitatively evaluated because they have no known toxicity data.	Underestimates		
Modifying and uncertainty factors for toxicity data	Modifying factors and uncertainty factors of varying degree are typically applied to toxicological values. These factors are used to conservatively account for extrapolating from animal studies for human health evaluation, and to conservatively account for variation in human populations.	Overestimates		

9. CONCLUSION

Using conservative model assumptions, the assessment indicated that residents who live as close as 300 meters directly downwind from the firing location are safe from breathing air emissions from the Tungsten M855. It is believed that the assumptions contained in this assessment are conservative enough to be protective of all the population including the sick, elderly, and children.

10. RECOMMENDATIONS

At installations where offsite residents are located less than 300-meters from the Tungsten M855 firing location, a more site-specific evaluation is recommended. However, it should be noted that at most training installations, training areas are over 1,000 meters (over half a mile) away from populated areas.

The results from this study are intended for a hypothetical training facility, and actual results may vary depending on site-specific conditions. This study used conservative assumptions (e.g., worst-case meteorological conditions, receptor located directly downwind, etc.) and it is believed that most site-specific analyses would result in even lower concentrations. Therefore, the results from this assessment should be applicable to most training facilities unless site-specific conditions vary significantly.

11. POINT OF CONTACT

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APPENDIX A
REFERENCES

- 1. U.S. Army (1994). Technical Manual, Army Ammunition Data Sheets for Small Caliber Ammunition. TM-43-0001-27.
- 2. FAS Military Analysis Network (2000). *M16A2 5.56mm Semiautomatic Rifle*. Available online at www.fas.org/man/dod-101/sys/land/m16.htm.
- 3. U.S. Army. Email communication between Mr. Bill Bolt, ATC, and Ms. Joleen Mobley, USACHPPM. Subject: Electronic copy of Firing Point Emission Study Series 4 Emission Factors, 10 April 2001.
- 4. USACHPPM (Aug. 2000). Ambient Air Quality Consultation NO. 43-EL-1485-00 Air Dispersion Modeling Evaluation For Military Munitions, Aberdeen Proving Ground, MD.
- 5. Bowman Environmental, Inc. (1999). *INPUFF2, Multiple Source Integrated Puff Model*, Version 4.1.
- 6. Title 40, Code of Federal Regulations, Part 68 (40 CFR 68), Chemical Accident Prevention Provisions, 1 July 1998.
- 7. U.S. Army. Email communication between Ms. Tamera Clark-Rush, AEC, and Ms. Hsieng-Ye Chang, USACHPPM. Subject: Scenarios (Small Caliber Ammunition), 12 September 2000.
- 8. Army Training Evaluation Protocol (ARTEP) 7-20-MTP, *Mission Training Plan for the Infantry Battalion*.
- 9. EPA (Oct. 2000). Region 3 Risk Based Concentration (RBC) Tables. Available online at www.epa.gov/reghwmd/risk/riskmenu.htm
- 10. EPA (Nov. 2000). Region 9 Preliminary Remediation Goals (PRG). Available online at www.epa.gov/region09/waste/sfund/prg/index.html
- 11. EPA. *National Ambient Air Quality Standards*. Available online at http://www.epa.gov/ airprogm/airs/criteria.html
- 12. Total Petroleum Hydrocarbon Criteria Working Group (1997). Development of Fraction Specific Reference Doses (RfDs) and Reference Concentrations (RfCs) for Total Petroleum Hydrocarbons (TPH), Volume 4. Amherst Scientific Publishers. Amherst, MA.
- 13. Manahan, Stanley (1994). *Environmental Chemistry*. Sixth edition. CRC Press, Inc. Boca Raton, FL.
- 14.U.S. Army (1996). Final Screening Risk Assessment for the Anniston Chemical Agent Disposal Facility at the Anniston Army Depot, Alabama. Revision No. 5. Prepared

- by the U.S. Army Center for Health Promotion and Preventive Medicine for the Program Manager for Chemical Demilitarization. Aberdeen Proving Ground, Maryland.
- 15. U.S. Army (1997). Final Screening Risk Assessment for the Pine Bluff Chemical Agent Disposal Facility at the Pine Bluff Arsenal, Arkansas. Revision No. 1. Prepared by the U.S. Army Center for Health Promotion and Preventive Medicine for the Program Manager for Chemical Demilitarization. Aberdeen Proving Ground, Maryland.
- 16. American Industrial Hygiene Association (AIHA) (1999). *Emergency Response Planning Guidelines*. AIHA Press, Fairfax, VA.
- 17. Department of Energy (1998). *Temporary Emergency Exposure Limits*, Revision 15. http://www.scapa.bnl.gov.
- 18. Agency for Toxic Substances and Disease Registry (1995). *Toxicological Profile for Cyanide*.
- 19. Agency for Toxic Substances and Disease Registry (1999). *Toxicological Profile for Lead*.

APPENDIX B AIR DISPERSION MODELING OUTPUT DATA

	The second secon	Cartridge, 5,5	Cartridge, 5,56-mm Ball,M855 No-Lead	No-Lead		No. of rounds (I)		1 round
	Number of items:	s: Trial #1B =>	15	Trial #2B =>	15	release duration (t):		2 seconds
		Net Explosive We	e Weight - N.E.W. per item (lbs.) =>	r item (lbs.) =>	3.86E-03	Unit Concentration (UC):	2.030E-04	2.030E-04 g/m³/(g/s)
		ATC Firing Test	Test Results ¹					
	Trial #1B	Trial #2B	Daily	Average	Averade	Total Mass	Substance	Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Concentration	Emission
	Actual	Actual	Background	Emission	Emission	Emitted	(grams/m³)	Rafe
Compound	Concentration	Concentration	Concentration	Factor	Factor	(grams/nem)		(d/litem)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)(EF)	(lb./lb: NEW)		CONC	ER,
Permanent Gases								
Ammania (NH ₃)	2.66E+01	2.38E+01	ΑN	2.48E-05	6.42E-03	1.123E-02	1.140E-06	5.615E-03
Carbon Dioxide (CO ₂)	9.79E+02	9.90E+02	NA	9.67E-04	2.51E-01	4.388E-01	4.454E-05	2.194E-01
Carbon Monoxide (CO)	1.85E+03	1.84E+03	NA	1.81E-03	4.69E-01	8.208E-01	8.331E-05	4.104E-01
Oxides of Nitrogen (NO _x)	1.05E+01	1.19E+01	NA	1.10E-05	2.85E-03	4.988E-03	5.063E-07	2.494E-03
Sulfur Dioxide (SO ₂)	5.24E-01	5.24E-01	NA	QN	Q	ND	QN	Q
Acid Gases								
Hydrogen Fluoride	2.20E-01	2.20E-01	2.20E-01	QN	QN	QN	QN	QN
Hydrogen Chloride	2.20E-01	2.20E-01	2.10E-01	QN	QN	QN	QN	QN
Hydrogen Bromide	2.10E-01	2.10E-01	2.10E-01	ND	QN	QN	Q	Q
Nitric Acid	2.20E-01	2.20E-01	2.10E-01	ND	ON	QN	Q	QN
Phosphoric Acid	2.20E-01	2.20E-01	2.10E-01	ND	ND	ND	QN	Q
Sulfuric Acid	2.20E-01	2.20E-01	2.10E-01	ND	QN	QN	QN	QN
Cyanide					į.			
Particulate Cyanide	1.30E-02	1.30E-02	1.30E-02	1.49E-08	3.85E-06	6.741E-06	6.842E-10	3.370E-06
Hydrogen Cyanide	1.88E+01	2.03E+01	2.70E-02	2.23E-05	5.79E-03	1.013E-02	1.028E-06	5.064E-03
Particulate								William Control of the Control of th
Total Suspended Particulate	3.86E+01	3.85E+01	NA	4.41E-05	1.14E-02	1.999E-02	2.029E-06	9.996E-03
Particulate Matter <10 microns	3.86E+01	3.76E+01	AN	4.35E-05	1.13E-02	1.975E-02	2.005E-06	9.876E-03
Particulate Matter <2.5 microns	2.90E+01	2.82E+01	NA	3.27E-05	8.46E-03	1.481E-02	1.504E-06	7.407E-03
Metals								
Aluminum	2.670E-01	3.053E-01	1.027E-01	2.26E-07	5.86E-05	1.026E-04	1.042E-08	5.131E-05
Antimony	1.380E+00	1.447E+00	1.141E-02	1.62E-06	4.19E-04	7.330E-04	7.440E-08	3.665E-04
Arsenic	1.131E-02	1.174E-02	1.141E-02	ON	QN	QN	S	S
Barium	4.843E-01	4.932E-01	1.141E-02	5.59E-07	1.45E-04	2.534E-04	2.572E-08	1.267E-04
Beryllium	1.131E-02	1.174E-02	1.141E-02	ND	ND	QN	QN	QN
Cadmium	1.131E-02	1.174E-02	1.141E-02	QN	ND	QN	QN	QN

Table B-1: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 100 meter location

	T-13-1 44-0	· COM I THE						•
		111al #25	Daily	Average	Average	lotal Mass	Substance	Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Concentration	Emission
	Actual	Actual	Background	Emission	Emission	Emitted	(grams/m³)	Rate
Compound	Concentration	Concentration	Concentration	Factor	Factor	(grams/item)		(g/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)(EF)	(Ib./Ib. NEW)		CONC	ER
Calcium	5.476E-01	5.589E-01	3.424E-02	5.99E-07	1.55E-04	2.716E-04	2.757E-08	1.358E-04
Chromium	1.131E-02	1.174E-02	1.141E-02	QN	QN	QN	QN	QN
Cobalt	1.131E-02	1.174E-02	1.141E-02	QN	QN	ON	QN	QN
Copper	1.358E+01	1.437E+01	1.141E-02	1.60E-05	4.14E-03	7.247E-03	7.356E-07	3.623E-03
Lead	6.359E+00	5.754E+00	1.141E-02	6.92E-06	1.79E-03	3.140E-03	3.187E-07	1.570E-03
Magnesium	8.373E-02	7.750E-02	1.141E-02	9.22E-08	2.39E-05	4.180E-05	4.243E-09	2.090E-05
Manganese	1.131E-02	1.174E-02	1.141E-02	ND	QN	QN	ND	QN
Nickel	1.131E-02	1.174E-02	1.141E-02	ND	Q	QN	ND	Q
Selenium	1.131E-02	1.174E-02	1.141E-02	1.34E-08	3.48E-06	6.100E-06	6.191E-10	3.050E-06
Silver	1.131E-02	1.174E-02	1.141E-02	ND	QN	QN	QN.	QN
Thallium	1.131E-02	1.174E-02	1.141E-02	ND	QN	QN	QN	QN
Vanadium	1.131E-02	1.174E-02	1.141E-02	QN	QN	QN	ΩN	QN
Zinc	1.892E+00	1.935E+00	1.141E-02	2.19E-06	5.67E-04	9.922E-04	1.007E-07	4.961E-04
TO-11 Carbonyls	, and an				1			
Formaldehyde	3.70E-01	3.70E-01	2.00E-01	4.23E-07	1.10E-04	1.919E-04	1.947E-08	9.593E-05
Acetaldehyde	3.90E-01	3.50E-01	1.60E-01	2.66E-07	6.89E-05	1.205E-04	1.223E-08	6.026E-05
Acetone	3.10E+00	3.10E+00	3.24E+00	3.60E-07	9.34E-05	1.635E-04	1.659E-08	8.173E-05
Acrolein	2.00E-01	2.00E-01	2.00E-01	ON	QN	QN	QN	QN
Proprionaldehyde	2.00E-01	2.00E-01	2.00E-01	ON	ON .	QN	QN	QN
Crotonaldehyde	2.00E-01	2.00E-01	2.00E-01	QN	QN	QN	QN	QN
Butyraldehyde	2.00E-01	2.00E-01	2.00E-01	Ω	Q	QN	ND	QN
Benzaldehyde	2.00E-01	2.00E-01	2.00E-01	QN	ΩN	QN	QN	QN ND
Isovaleraldehyde	2.00E-01	2.00E-01	2.00E-01	QN	Q.	ND	QN	QN
Valeraldehyde	2.00E-01	2.00E-01	2.00E-01	ND	Q	ON	QN	QN
o,m,p-Tolualdehyde	6.00E-01	6.00E-01	6.00E-01	Q	QN	QN	QN	QN
Hexaldehyde	2.00E-01	2.00E-01	2.00E-01	ON	QN	ON	QN	QN
2,5-Dimethylbenzaldehyde	2.00E-01	2.00E-01	2.00E-01	ND	QN	ΩN	QN	QN
TO-14 VOCs (extended list)	11							
Propene	6.54E-02	6.54E-02	1.72E-03	6.90E-08	1.79E-05	3.128E-05	3.175E-09	1.564E-05
Dichlorodiflouromethane	4.45E-03	3.46E-03	3.96E-03	3.83E-10	9.92E-08	1.736E-07	1.762E-11	8.679E-08
Chlorodifluoromethane	3.54E-03	3.54E-03	3.54E-03	ND	QN	QN	QN	QN
Freon 114	6.99E-03	6.99E-03	6.99E-03	Q	QN	ND	QN	QN

Table B-1: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 100 meter location

	Trial #1B	Trial #2B	Daily	Average	Average	Total Mass	Substance	Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Concentration	Emission
	Actual	Actual	Background	Emission	Emission	Emitted	(grams/m³)	Rate
Compound	Concentration	Concentration	Concentration	Factor	Factor	(grams/item)		(g/item)/sec
	(നുg/ന്ന³)	(നു/നീ)	(mg/m³)	(lb://tem)(EF)	(Ib./lb.:NEW)	M	CONC	ER,
Chloromethane	1.24E-03	1.45E-03	1.45E-03	3.08E-11	7.98E-09	1.397E-08	1.418E-12	6.985E-09
Vinyl Chloride	2.56E-03	2.56E-03	2.56E-03	Q	Q	QN	QN	QN
1,3-Butadiene	1.11E-02	1.11E-02	2.21E-03	1.20E-08	3.10E-06	5,421E-06	5.502E-10	2.710E-06
Bromomethane	3.88E-03	3.88E-03	3.88E-03	DN	QN	QN	ND	ND
Chloroethane	2.64E-03	2.64E-03	2.64E-03	QN	ND	ND	QN	ND
Dichlorofluoromethane	4.21E-03	4.21E-03	4.21E-03	ND	QN	ND	QN	ND
Trichldroflouromethane	1.69E-03	1.69E-03	1.69E-03	1.65E-10	4.27E-08	7.480E-08	7.593E-12	3.740E-08
Pentane	2.36E-03	2.36E-03	2.95E-03	QN	QN	QN	QN	ND
Acrolein	5.27E-02	2.29E-02	2.29E-03	4.07E-08	1.06E-05	1.848E-05	1.876E-09	9.240E-06
1,1-Dichlorethene	4.05E-03	4.05E-03	4.05E-03	QN	DN	QN	QN	QN
Freon 113	7.68E-03	7.68E-03	7.68E-03	QN	ND	QN	ND	ND
Acetone	1.90E-02	1.66E-02	2.14E-02	QN	QN	QN	QN	ND
Methyl lodide	5.81E-03	5.81E-03	5.81E-03	QN	ΩN	QN	ND	ΔN
Carbon Disulfide	3.11E-03	3.11E-03	3.11E-03	QN	ND	ND	QN	ND
Acetonitrile	1.36E-01	1.34E-01	1.68E-03	1.46E-07	3.78E-05	6.623E-05	6.722E-09	3.311E-05
3-Chloropropene	3.13E-03	3.13E-03	3.13E-03	QN	ND	ND	QN	ND
Methylene Chloride	3.23E-01	2.33E-01	2.43E-01	6.09E-08	1.58E-05	2.763E-05	2.805E-09	1.382E-05
tert-Butyl Alcohol	3.03E-03	3.03E-03	3.03E-03	QN	QN	QN	QN	QN
Acrylonitrile	4.34E-02	4.56E-02	2.17E-03	4.81E-08	1.25E-05	2.181E-05	2.213E-09	1.090E-05
trans-1,2-Dichloroethene	3.96E-03	3.96E-03	3.96E-03	QN	ND	QN	QN	QN
Methyl t-Butyl Ether	2.16E-03	2.16E-03	3.24E-03	ON	QN	QN	ΩN	QN
Hexane	2.11E-03	1.76E-03	2.82E-03	QN	Q	Q	QN	QN
1,1-Dichloroethane	3.97E-03	3.97E-03	3.97E-03	QN	Q	Q	QN	ND
Vinyl Acetate	3.52E-03	3.52E-03	3.52E-03	QN	ND	ON	ND	QN
cis-1,2-Dichloroethene	3.96E-03	3.96E-03	3.96E-03	QN	ND	ON	QN	QN
2-Butanone	2.95E-03	2.95E-03	2.06E-03	1.16E-09	3.00E-07	5.252E-07	5.331E-11	2.626E-07
Ethyl Acetate	1.80E-02	2.52E-02	3.60E-03	2.34E-08	6.06E-06	1.061E-05	1.077E-09	5.305E-06
Methyl Acrylate	3.52E-03	3.52E-03	3.52E-03	QN	QN	QN	ON	QN
Chloroform	4.88E-03	4.88E-03	4.88E-03	QN	ON	ON	ON	QN
1,1,1-Trichloroethane	5.46E-03	5.46E-03	5.46E-03	QN	QN	QN	QN	QN
Carbon Tetrachloride	6.29E-03	6.29E-03	6.29E-03	Q	Q	ON	QN	Q
1,2-Dichlorethane	8.09E-03	8.09E-03	4.05E-03	8.75E-09	2.27E-06	3.967E-06	4.026E-10	1.983E-06

Table B-1: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 100 meter location

		I rial #28	Daily	Average	Average	Total Mass	Substance	Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Concentration	Emission
	Actual	Actual	Background	Emission	Emission	Emitted	(grams/m ³)	Rate
Compound	Concentration	Concentration	Concentration	Factor	Factor	(grams/item)		(a/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)(EF)	(Ib./Ib. NEW)		CONC	ER,
Benzene	5.11E-01	5.43E-01	1.28E-03	5.68E-07	1.47E-04	2.578E-04	2.617F-08	1 289F-04
Isooctane	4.67E-03	4.67E-03	9.34E-04	ND	QN	QN	CN	CN
Heptane	8.20E-04	4.10E-03	8.20E-04	7.29E-11	1.89E-08	3.306E-08	3.356F-12	1 653E-08
Trichloroethane	4.88E-03	4.88E-03	4.88E-03	QN	QN	Q	GN	ON CIN
Ethyl Acrylate	4.09E-03	4.09E-03	4.09E-03	QN	QN	Q	GN	S
1,2-Dichloropropane	4.62E-03	4.62E-03	4.62E-03	QN	QN	Q	QN	C N
Methyl Methacrylate	4.09E-03	4.09E-03	4.09E-03	QN	QN	QN	2	QN
Dibromomethane	7.11E-03	7.11E-03	7.11E-03	QN	QN	QN	QN	QX
1,4-Dioxane	3.60E-03	3.60E-03	3.60E-03	QN	QN	ND	QN	CN
Bromodichloromethane	6.70E-03	6.70E-03	6.70E-03	ND	QN	QN	QN	QN
cis-1,3-Dichloropropene	4.54E-03	4.54E-03	4.54E-03	QN	Q	QN	QN	CN
4-Methyl-2-Pentanone	4.10E-03	4.10E-03	4.10E-03	ND	Q.	QN	QN	QX
Toluene	2.64E-02	2.64E-02	2.64E-03	2.59E-08	6.71E-06	1.175E-05	1.193E-09	5.877F-06
Octane	4.67E-03	4.67E-03	4.67E-03	QN	Q.	QN	QN	CN
trans-1,3-Dichloropropene	4.54E-03	. 4.54E-03	4.54E-03	QN	QN	QN	QN	2
Ethyl Methacrylate	4.67E-03	4.67E-03	4.67E-03	ON	QN	QN	2	QN
1,1,2-Trichloroethane	5.46E-03	5.46E-03	5.46E-03	ND	QN	QN	QN	QN
Tertrachforoethene	6.78E-03	6.78E-03	6.78E-03	QN	QN	QN	QN	QN
2-Hexanone	4.10E-03	4.10E-03	4.10E-03	ND	QN	QN	Q.	QN
Dibromochloromethane	8.52E-03	8.52E-03	8.52E-03	ND	QN	QN	QV	QN
1,2-Dibromoethane	7.68E-03	7.68E-03	7.68E-03	Q	ND	QN	Q	QN
Chlorobenzene	4.60E-03	4.60E-03	4.60E-03	QN	QN	QN	QV	QN
1,1,1,2-1 etrachioroethane	6.87E-03	6.87E-03	6.87E-03	Ω	Q	DN	QN	QN
Etnylbenzene	4.34E-03	3.47E-03	4.34E-03	QN	Q	QN	QN	QN
m/p-Xylene	1.30E-02	1.30E-02	2.17E-02	Q	QN	QN	Q	QN
o-Xylene	1.30E-02	1.30E-02	2.17E-02	Q	ND	QN	QN	QN
Styrene	8.52E-03	8.52E-03	4.26E-03	9.21E-09	2.39E-06	4.175E-06	4.238E-10	2.088E-06
Bromotorm	1.03E-02	1.03E-02	1.03E-02	QN	ND	QN	QN	QN
Cumene	4.92E-03	4.92E-03	4.92E-03	Ω	ND	QN	QN	QN
1,1,2,2-letrachlorethane	6.87E-03	6.87E-03	6.87E-03	Q	QN	ON	QV	QN
1,2,3-1 richloropropane	6.03E-03	6.03E-03	6.03E-03	Q.	ΩN	ND	QN	QN
Bromobenzene	6.42E-03	6.42E-03	6.42E-03	Q	ND	QN	QN	QN

Table B-1: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 100 meter location

Compound Measured Actual Actual Compound Concentration (mg/m³) 4-Ethyltoluene 2.46E-03 1,3,5-Trimethylbenzene 1.97E-03 Alpha Methyl Styrene 4.83E-03 1,2,4-Trimethylbenzene 6.01E-03 1,4-Dichlorobenzene 6.01E-03 Hexachlorobenzene 6.01E-03 Hexachlorobenzene 6.01E-03 Hexachlorobenzene 7.42E-03 Hexachlorobenzene 9.68E-03 1.2,4-Trichlorobenzene 1.07E-02 Hydrocarbons 9.84E+00 Ethylene 4.93E-01 Acetylene 6.39E-02 Ethane 2.48E-01 Propylene 8.26E-02	****	Measured	Adjusted	Adinstad		Concentration	Emíssion
benzene nzene nzene nzene nzene nzene adiene	117	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Mary Control of the C		of Substance		
Ibenzene Ibenzene Ibenzene Izene Inzene Inze	: :	Background	Emission	Emission	Emitted	(grams/m³)	Rate
benzene benzene nzene nzene nzene e nzene adiene	n Concentration	Concentration	Factor	Factor	(grams/item)		(g/item)/sec
benzene benzene nzene nzene nzene e nzene adiene	(mg/m³)	(mg/m³)	(lb./item)(EF)	(Ib./Ib. NEW)		CONC	굒
hyl Styrene ethylbenzene ethylbenzene robenzene loride robenzene ethane ellorobenzene obutadiene	2.46E-03	2.95E-03	QN	QN	ND	QN	QN
hyl Styrene ethylbenzene robenzene loride robenzene ethane ellorobenzene obutadiene	1.97E-03	2.46E-03	Q	QN	QN	Q	QN
ethylbenzene robenzene robenzene loride robenzene ethane slorobenzene boutadiene	4.83E-03	4.83E-03	Q	QN	QN	QN	QN
robenzene robenzene loride robenzene ethane vlorobenzene boutadiene	4.92E-03	9.83E-03	QV	QN	ND	QN	ΩN
robenzene loride robenzene ethane nlorobenzene obutadiene	6.01E-03	6.01E-03	QN	QN	QN	QN	QN
loride robenzene ethane llorobenzene obutadiene	6.01E-03	6.01E-03	QN	QN	QN.	QN.	QN
robenzene ethane ilorobenzene obutadiene <u>bons</u>	5.18E-03	5.18E-03	Q	QN	QN	QN	QN
ethane Ilorobenzene obutadiene <u>bons</u>	6.01E-03	6.01E-03	QV	QN	QN	QN	S
ilorobenzene obutadiene <u>bons</u>	9.68E-03	9.68E-03	QV	QN	QN	QN	QN
obutadiene b <u>ons</u>	7.42E-03	7.42E-03	QN	QN	QN	QN	ΩN
<u>suog</u>	1.07E-02	1.07E-02	QN	QN	QN	QN	QN
							The state of the s
	9.18E+00	9.84E-01	9.91E-06	2.57E-03	4.494E-03	4.561E-07	2.247E-03
	4.85E-01	2.87E-02	5.59E-07	1.45E-04	2.537E-04	2.575E-08	1.269E-04
	. 6.60E-02	2.56E-02	7.43E-08	1.92E-05	3.369E-05	3.419E-09	1.684E-05
	2.50E-01	2.95E-02	2.85E-07	7.38E-05	1.291E-04	1.311E-08	6.457E-05
	8.78E-02	4.13E-02	9.74E-08	2.52E-05	4.418E-05	4.484E-09	2.209E-05
Frobane 4.55⊏-02	4.33E-02	4.33E-02	ND	QN	QN	Q	QN
Propyne 3.84E-02	3.84E-02	3.84E-02	QN	QN	QN	QN	QN
Isobutane 5.47E-02	5.47E-02	5.47E-02	ND	QN	QN	QN	QN
	1.08E-01	1.08E-01	ND	QN	QN	Q	Q
ene/butane	1.65E-01	1.65E-01	ND	ND	ND	QN	2
	5.51E-02	5.51E-02	ND	ND	QN	QN	ΩN
trans-butene	1.06E-01	1.06E-01	Q.	ND	ND	QN	QN.
	5.31E-02	5.31E-02	ND	ND	ND	QN	2
n-Pentane 7.08E-02	7.08E-02	7.08E-02	QN	ND	QN	Q	QN.
n-Hexane 7.75E-02	7.75E-02	7.75E-02	QN	QN	QN	S	QN
SVOCs (8270 LIST)							
ө	1.78E-02	1.81E-02	ON	QN	ON	QN	QN
hloroethyl)ether	1.78E-02	1.81E-02	ND	QN	QN	Q	ΩN
	1.78E-02	1.81E-02	ND	QN	QN	Q	QN
2-chlorophenol 1.78E-02	1.78E-02	1.81E-02	QN	Q	QN	QN	QN

Table B-1: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 100 meter location

Compound			رقاح	Average	Average	Total Mass	Substance	Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Concentration	Emission
	Actual	Actual	Background	Emission	Emission	Emitted	(grams/m³)	Rate
	Concentration	Concentration	Concentration	Factor	Factor	(grams/item)		(g/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)(EF)	(Ib./Ib. NEW)		CONC	ER,
1,3-dichlorobenzene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
1,4-dichlorobenzene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
1,2-dichlorobenzene	1.78E-02	1.78E-02	1.81E-02	ND	ND	QN	QN	QN
Benzyl alcohol	1.78E-02	1.78E-02	1.81E-02	ND	QN	QN	QN	QN
Bis(2-chloroisopropyl)ether	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
2-methylphenol	1.78E-02	1.78E-02	1.81E-02	ND	Q	QN	QN	Q.
Hexachloroethane	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
N-nitroso-di-n-propylamine	1.78E-02	1.78E-02	1.81E-02	ON	ON	QN	QN	QN
4-methylphenol	1.78E-02	1.78E-02	1.81E-02	ON	QN	QN	QN	ND
Nitrobenzene	1.78E-02	1.78E-02	1.81E-02	ND	QN	QN	QN	QN
Isophorone	1.78E-02	1.78E-02	1.81E-02	ON	ND	QN	QN	QN
2-nitrophenol	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
2,4-dimethylphenol	1.78E-02	1.78E-02	1.81E-02	ND	QN	ΩN	QN	QN
Bis(2-chloroethoxy)methane	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
2,4-dichlorophenol	1.78E-02	1.78E-02	1.81E-02	ND	QN	QN	QN	2
1,2,4-trichlorobenzene	1.78E-02	1.78E-02	1.81E-02	QN	ND	QN	QN	QN
Naphthalene	1.12E-02	1.30E-02	1.81E-02	1.31E-08	3.39E-06	5.929E-06	6.018E-10	2.965E-06
4-chloroaniline	1.78E-02	1.78E-02	1.81E-02	ND	ND	QN	QV	QN
Hexachlorobutadiene	1.78E-02	1.78E-02	1.81E-02	ND	QN	QN	QN	QN
4-chloro-3-methylphenol	1.78E-02	1.78E-02	1.81E-02	ΩN	QN	QN	Q	QN
2-methylnaphthalene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Hexachlorocyclopentadiene	1.78E-02	1.78E-02	1.81E-02	ND	Q	ND	QN	QV
2,4,6-trichlorophenol	1.78E-02	1.78E-02	1.81E-02	Q	Q	ND	QN	QN
2,4,5-trichlorophenol	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
2-chloronaphthalene	1.78E-02	1.78E-02	1.81E-02	QN	Q	ND	QN	Q
2-nitroaniline	1.78E-02	1.78E-02	1.81E-02	ND	Q	ND	QN	QN
Acenaphthylene	1.78E-02	1.78E-02	1.81E-02	Q	QN	QN	QN	QN
Dimethylphthalate	1.78E-02	1.78E-02	1.81E-02	Q.	ND	ND	QN	QN
2,6-dinitrotoluene	1.78E-02	1.78E-02	1.81E-02	ND	QN	ND	QN	QN
Acenaphthene	1.78E-02	1.78E-02	1.81E-02	Q	ND	ND	QN	ΩN
3-nitroaniline	3.55E-02	3.56E-02	3.62E-02	ND	Q	ND	QN	Q
2,4-dinitrophenol	3.55E-02	3.56E-02	3.62E-02	Q	QN	QN	QN	ND

Table B-1: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 100 meter location

	Trio!#1D	Trial #20	Daile	Autorona	Company of the second s	A Report	Section of the Control of the Contro	2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Measured	Measured	Measured	Adiretad	Adinetad	Of Culbetance	Concentration	Substance
	Actual	Actual	Background	Emission	Emission		Concellination.	
Compound	Concentration	Concentration	Concentration	Factor	Factor	(drams/item)		(d/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)(EF)	(lb./lb. NEW)	N	CONC	ER,
Dibenzofuran	1.78E-02	1.78E-02	1.81E-02	QN	Q	ON	ON	QN
2,4-dinitrotoluene	1.78E-02	1.78E-02	1.81E-02	P	2	QN	QN	QN
4-nitrophenol	3.55E-02	3.56E-02	3.62E-02	QN	Q	QN	QN	QN
Fluorene	1.78E-02	1.78E-02	1.81E-02	QN	Q	QN	QN	QN
4-chlorophenyl-phenylether	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Diethylphthalate	1.78E-02	1.78E-02	1.81E-02	QN	QN	S	QN	QN
4-nitroaniline	3.55E-02	3.56E-02	3.62E-02	QN	Q	QN	QN	QN
4,6-dinitro-2-methylphenol	3.55E-02	3.56E-02	3.62E-02	QN	QN	QN	QN	QN
N-nitrosodiphenylamine(1)	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
4-bromophenyl-phenylether	1.78E-02	1.78E-02	1.81E-02	ND	QN	QN	QN	QN
Hexachlorobenzene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Pentachlorophenol	3.55E-02	3.56E-02	3.62E-02	QN	QN	QN	QN	QN
Phenanthrene	1.78E-02	1.78E-02	1.81E-02	ΩN	QN	S	QV	QN
Anthracene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Di-n-butylphthalate	1.78E-02	1.10E-02	1.81E-02	2.58E-07	6.67E-05	1.168E-04	1.186E-08	5.840E-05
Fluoranthene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Pyrene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Butylbenzylphthalate	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Benzo(a)anthracene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Chrysene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Bis(2-ethylhexyl)phthalate	6.04E-02	5.51E-02	6.52E-02	8.43E-07	2.18E-04	3.823E-04	3.880E-08	1.912E-04
Di-n-octylphthalate	1.78E-02	1.78E-02	1.81E-02	ΩN	QN	ND	QN	Q
Benzo(b)fluoranthene	1.78E-02	1.78E-02	1.81E-02	Q	QN	QN	QN	Q
Benzo(k)fluoranthene	1.78E-02	1.78E-02	1.81E-02	Q	QN	ON	QN	Q
Benzo(a)pyrene	1.78E-02	1.78E-02	1.81E-02	Q	ΩN	ND	QN	Q
Indeno(1,2,3-cd)pyrene	1.78E-02	1.78E-02	1.81E-02	Q	Ω	ON	QN	QN
Dibenz(a,h)anthracene	1.78E-02	1.78E-02	1.81E-02	ND	QN	QN	QV	QN
Benzo(g,h,i)perylene	1.78E-02	1.78E-02	1.81E-02	ND	QN	QN	QV	QN
TO-13 PAHs								
Naphthalene	9.07E-03	1.05E-02	2.72E-04	1.03E-08	2.67E-06	4.674E-06	4.745E-10	2.337E-06
Acenaphthylene	4.27E-04	5.34E-04	1.81E-05	5.19E-10	1.35E-07	2.355E-07	2.390E-11	1.177E-07
Acenaphthene	8.00E-05	8.72E-05	2.17E-05	6.90E-11	1.79E-08	3.129E-08	3.176E-12	1.564E-08

Table B-1: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 100 meter location

	Trial #1B	Trial #2B	Daily	Average	Averano	Total Moon	1.0	•
	Measured	Measured	Measured	Adiusted	Adilisted	of Substance	Concentration	Substance
	Actual	Actual	Background	Emission	Emission	Emitted	(orams/m³)	Date
Compound	Concentration	Concentration	Concentration	Factor	Factor	(grams/item)		(a/item)/sec
Books and statement of the statement of	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)(EF)	(lb./lb. NEW)		CONC	ER,
Fluorene	2.49E-04	2.85E-04	3.08E-05	2.58E-10	6.69E-08	1.171E-07	1.188E-11	5.853E-08
Phenanthrene	3.02E-04	3.91E-04	9.23E-05	2.84E-10	7.37E-08	1.290E-07	1.309E-11	6.448E-08
Anthracene	4.44E-05	5.51E-05	1.81E-05	5.38E-11	1.40E-08	2.442E-08	2.479E-12	1.221E-08
Fluoranthene	2.84E-04	3.74E-04	3.26E-05	3.24E-10	8.39E-08	1.469E-07	1.491E-11	7.343E-08
Pyrene	7.29E-04	9.61E-04	3.08E-05	8.83E-10	2.29E-07	4.007E-07	4.067E-11	2.003E-07
Benzo(a)anthracene	1.37E-04	1.78E-04	1.81E-05	1.70E-10	4.41E-08	7.720E-08	7.836E-12	3.860E-08
Chrysene	1.55E-04	2.13E-04	1.81E-05	1.99E-10	5.16E-08	9.031E-08	9.166E-12	4.515E-08
Benzo(b)fluoranthene	1.78E-04	2.49E-04	1.81E-05	2.31E-10	5.98E-08	1.047E-07	1.063E-11	5.236E-08
Benzo(k)fluoranthene	9.24E-05	1.41E-04	1.81E-05	1.26E-10	3.27E-08	5.718E-08	5.803E-12	2.859E-08
Benzo(e)pyrene	2.13E-04	2.85E-04	1.81E-05	2.69E-10	6.98E-08	1.221E-07	1.240E-11	6.107E-08
Benzo(a)pyrene	1.78E-04	2.49E-04	1.81E-05	2.31E-10	5.98E-08	1.047E-07	1.063E-11	5.236E-08
Indeno(1,2,3-cd)pyrene	1.53E-04	2.13E-04	1.81E-05	1.98E-10	5.14E-08	8.988E-08	9.123E-12	4.494E-08
Dibenz(a,h)anthracene	1.78E-05	2.49E-05	1.81E-05	2.71E-11	7.03E-09	1.230E-08	1.249E-12	6.152E-09
Benzo(g,h,i)perylene	6.04E-04	9.61E-04	1.81E-05	8.47E-10	2.19E-07	3.842E-07	3.899E-11	1.921E-07
Dioxins and Furans					1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
2378-TCDD	3.70E-10	3.80E-10	3.51E-10	4.35E-16	1.13E-13	1.974E-13	2.003E-17	9.869E-14
12378-PECDD	6.89E-10	5.94E-10	7.22E-10	QN	Q	QN	QN	QN
123478-HXCDD	3.28E-10	2.72E-10	3.31E-10	QN	Q.	QN	QN	QN
123678-HXCDD	3.46E-10	2.90E-10	3.39E-10	QN	Q	QN	QN	QN
123789-HXCDD	3.17E-10	2.64E-10	3.15E-10	QN	QN	QN	QN	QN
1234678-HPCDD	3.13E-09	3.64E-09	1.98E-09	1.92E-15	4.99E-13	8.730E-13	8.861E-17	4.365E-13
OCDD	2.31E-08	2.59E-08	1.48E-08	1.35E-14	3.50E-12	6.121E-12	6.213E-16	3.061E-12
2378-TCDF	5.71E-10	5.28E-10	8.60E-10	QN	Q	QN	QN	QN
123/8-PECDF	6.10E-10	5.66E-10	6.63E-10	Q	Q	QN	QN	QN
234/8-PECUF	4.55E-10	4.20E-10	5.01E-10	Q.	Q	QN	QN	ΩN
1234/8-HXCDF	5.20E-10	5.50E-10	5.40E-10	8.10E-17	2.10E-14	3.676E-14	3.731E-18	1.838E-14
1236/8-HXCDF	4.44E-10	3.97E-10	4.38E-10	Q	Q	QN	QN	QN
123/89-HXCDF	2.22E-10	1.85E-10	2.11E-10	ND	ND	ND	QV	Q
234678-HXCDF	3.10E-10	2.61E-10	3.10E-10	Q	QN	QN	QN	QN
12346/8-HPCDF	9.10E-10	1.14E-09	7.50E-10	4.35E-16	1.13E-13	1.973E-13	2.003E-17	9.867E-14
1234789-HPCDF	4.62E-10	4.70E-10	4.33E-10	ΩN	Q	QN	QN	QN
OCDF	2.00E-09	1.09E-09	1.57E-09	2.23E-16	5.77E-14	1.010E-13	1.025E-17	5.050E-14

MMR_5.56_unleaded

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Table B-1: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 100 meter location

								•
		Trial #2B	Daily	Average	Average	Total Mass	Substance	Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Concentration	Emission
	Actual	Actual	Background	Emission	* Emission	Emitted	(grams/m³)	Rate
Compound	Concentration	Concentration	Concentration	Factor	Factor	(grams/item)		(g/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)(EF)	(ib./ib. NEW)		CONC	쮰
Energetics								
Nitrobenzene	2.00E+00	2.00E+00	ĄN	QN	QN	QN	QN	QN
2-Nitrotoluene	2.00E+00	2.00E+00	NA	QN	QN	QN	QN	QN
3-Nitrotoluene	2.00E+00	2.00E+00	NA	QN	QN	QN	QN	QN
4-Nitrotoluene	2.00E+00	2.00E+00	ΝΑ	QN	QN	QN	QN	QN
Nitroglycerine	2.00E+00	2.00E+00	V.	QN	QN	ΩN	QN	QN
1,3-Dinitrobenzene	2.00E+00	2.00E+00	ΑN	QN	Q	QN	QN	QN
2,6-Dinitrotoluene	2.00E+00	2.00E+00	Ā	QN	QN	QN	QN	QN
2,4-Dinitrotoluene	2.00E+00	2.00E+00	NA	QN	QN	QN	QV	QN.
1,3,5-Trinitrobenzene	2.00E+00	2.00E+00	NA	QN	QN	QN	QN	Q.
2,4,6-Trinitrotoluene	2.00E+00	2.00E+00	NA	QN	QN	QN	QN	QN.
RDX	2.00E+00	2.00E+00	NA	QN	QN	QN	QN	QN
4-Amino-2,6-Dinitrotoluene	2.00E+00	2.00E+00	NA	QN	QN	QN	QN	S
2-Amino-4,6-Dinitrotoluene	2.00E+00	2.00E+00	NA	QN	QN	QN	QN	QN
Tetryl	2.00E+00	. 2.00E+00	NA	ΩN	QN	QN	QN	QN.
HMX	4.00E+00	4.00E+00	NA	QN	ND	ON	QN	ΩN
Pentaerythritoltetranitrate	4.00E+00	4.00E+00	NA	ΩN	QN	QN	QN	ΩN
Dibutyl phthalate	5.00E+01	5.00E+01	NA	ΩN	QN	QN	QN	S
Dioctyl phthalate	5.00E+01	5.00E+01	NA	QN	QN	QN	QV	QN
Diphenylamine	5.00E+01	5.00E+01	NA	QN	QN	QN	QN	QN
Footnotes:								

¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emission Study)
NA = Not Applicable
ND = Not Detected

Table B-2: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 200 meter location

		Cartridge, 5.56 mm Ball, M855 No-Lead	nm Ball, M855 No	o-Lead		No. of rounds (I)		1 round
	Number of items:	1s: Trial #1B =>	15	Trial #2B =>	15	release duration (t):		seconds
		Net Explosive Weight - N⋅E⋅W: per item (lbs.) =>	ght - N.E.W. per	item (lbs.) =>	3.86E-03	Unit Concentration (UG):	7.778E-05	7.778E-05 g/m³/(g/s)
	**************************************	ATC FIN	ATC Firing Test Results	(s)				
	Trial #1B	Trial #2B	Daily	Average	Average	Total Mass		Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Substance	Emission
Compound	Actual	Actual	Background	Emission	Emission	Emilled	Concentration	Rate
	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams/item)	(grams/m³)	(g/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)	(Ib./Ib. NEW)		CONC	ER.
Permanent Gases			A CANADA CONTRACTOR OF THE CANADA CONTRACTOR O					
Ammonia (NH ₃)	2.66E+01	2.38E+01	ΑN	2.48E-05	6.42E-03	1.123E-02	2.184E-07	2.808E-03
Carbon Dioxide (CO ₂)	9.79E+02	9.90E+02	AN	9.67E-04	2.51E-01	4.388E-01	8.533E-06	1.097E-01
Carbon Monoxide (CO)	1.85E+03	1.84E+03	NA	1.81E-03	4.69E-01	8.208E-01	1.596E-05	2.052E-01
Oxides of Nitrogen (NO _x)	1.05E+01	1.19E+01	NA	1.10E-05	2.85E-03	4.988E-03	9.700E-08	1.247E-03
Sulfur Dioxide (SO ₂)	5.24E-01	5.24E-01	AN	Q	QN	QN	QN	QN
Acid Gases	(1) 10 10 10 10 10 10 10 10 10 10 10 10 10		The state of the s					
Hydrogen Fluoride	2.20E-01	2.20E-01	2.20E-01	QN	QN	ND	QN	2
Hydrogen Chloride	2.20E-01	2.20E-01	2.10E-01	QN	QN	ND	QN	QN
Hydrogen Bromide	2.10E-01	2.10E-01	2.10E-01	ND	QN	QN	QN	QN
Nitric Acid	2.20E-01	2.20E-01	2.10E-01	QN	QN	QN	Q	QN
Phosphoric Acid	2.20E-01	2.20E-01	2.10E-01	QN	QN	QN	Q	QN
Sulfuric Acid	2.20E-01	2.20E-01	2.10E-01	Q	QN	QN	QV	QN
Cyanide								
Particulate Cyanide	1.30E-02	1.30E-02	1.30E-02	1.49E-08	3.85E-06	6.741E-06	1.311E-10	1.685E-06
Hydrogen Cyanide	1.88E+01	2.03E+01	2.70E-02	2.23E-05	5.79E-03	1.013E-02	1.969E-07	2.532E-03
Particulate					多形均衡。 含于			
Total Suspended Particulate	3.86E+01	3.85E+01	NA	4.41E-05	1.14E-02	1.999E-02	3.887E-07	4.998E-03
Particulate Matter <10 microns	3.86E+01	3.76E+01	NA	4.35E-05	1.13E-02	1.975E-02	3.841E-07	4.938E-03
Particulate Matter <2.5 microns	2.90E+01	2.82E+01	NA	3.27E-05	8.46E-03	1.481E-02	2.881E-07	3.704E-03
<u>Metals</u>								
Aluminum	2.670E-01	3.053E-01	1.027E-01	2.26E-07	5.86E-05	1.026E-04	1.996E-09	2.566E-05
Antimony	1.380E+00	1.447E+00	1.141E-02	1.62E-06	4.19E-04	7.330E-04	1.425E-08	1.832E-04
Arsenic	1.131E-02	1.174E-02	1.141E-02	QN	ND	QN	QN	QN
Barium	4.843E-01	4.932E-01	1.141E-02	5.59E-07	1.45E-04	2.534E-04	4.928E-09	6.336E-05
Beryllium	1.131E-02	1.174E-02	1.141E-02	QN	ND	ΩN	Q	QN
Cadmium	1.131E-02	1.174E-02	1.141E-02	ND	ND	QN	QN	QN
Calcium	5.476E-01	5.589E-01	3.424E-02	5.99E-07	1.55E-04	2.716E-04	5.282E-09	6.791E-05
Chromium	1.131E-02	1.174E-02	1.141E-02	QN	ND	QN	QN	QN
Cobalt	1.131E-02	1.174E-02	1.141E-02	QN	ND	QN	QN	Q

Table B-2: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 200 meter location

	Trial #1B	Trial #2B	Daily	Average	Average	Total Mass	x 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Substance	Emission
Compound	Actual	Actual	Background	Emission	Emission	Emitted	Concentration	Rate
	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams/item)	(grams/m ³)	(a/item)/sec
	(mg/m³).	(mg/m³)	(mg/m³)	(lb./item)	(ib./ib. NEW)	X	CONC	ER,
Copper	1.358E+01	1.437E+01	1.141E-02	1.60E-05	4.14E-03	7.247E-03	1.409E-07	1.812E-03
Lead	6.359E+00	5.754E+00	1.141E-02	6.92E-06	1.79E-03	3.140E-03	6.106E-08	7.850E-04
Magnesium	8.373E-02	7.750E-02	1.141E-02	9.22E-08	2.39E-05	4.180E-05	8.128E-10	1.045E-05
Manganese	1.131E-02	1.174E-02	1.141E-02	Q	Q	QN	QN	Q
Nickel	1.131E-02	1.174E-02	1.141E-02	QN	QN	QN	QN	QV
Selenium	1.131E-02	1.174E-02	1.141E-02	1.34E-08	3.48E-06	6.100E-06	1.186E-10	1.525E-06
Silver	1.131E-02	1.174E-02	1.141E-02	ND	QN	QN	QN	QN
Thallium	1.131E-02	1.174E-02	1.141E-02	QN	QN	QN	QN	Q.
Vanadium	1.131E-02	1.174E-02	1.141E-02	QN	QN	QN	QN	QN
Zinc	1.892E+00	1.935E+00	1.141E-02	2.19E-06	5.67E-04	9.922E-04	1.929E-08	2.481E-04
TO-11 Carbonyls		46.5				1.4		
Formaldehyde	3.70E-01	3.70E-01	2.00E-01	4.23E-07	1.10E-04	1.919E-04	3.731E-09	4.796E-05
Acetaldehyde	3.90E-01	3.50E-01	1.60E-01	2.66E-07	6.89E-05	1.205E-04	2.344E-09	3.013E-05
Acetone	3.10E+00	3.10E+00	3.24E+00	3.60E-07	9.34E-05	1.635E-04	3.178E-09	4.086E-05
Acrolein	2.00E-01	2.00E-01	2.00E-01	QN	ND	QN	QN	Q
Proprionaldehyde	2.00E-01	2.00E-01	2.00E-01	QN	QN	QN	QN	QN.
Crotonaldehyde	2.00E-01	2.00E-01	2.00E-01	QN	QN	QN	QN	QN
Butyraldehyde	2.00E-01	2.00E-01	2.00E-01	QN	QN	QN	QN	QN
Benzaldehyde	2.00E-01	2.00E-01	2.00E-01	QN	QN	QN	QN	Q
Isovaleraldehyde	2.00E-01	2.00E-01	2.00E-01	QN	QN	QN	QN	Q
Valeraldehyde	2.00E-01	2.00E-01	2.00E-01	QN	ΩN	QN	QN	QN
o,m,p-Tolualdehyde	6.00E-01	6.00E-01	6.00E-01	QN	QN	QN	QN	QN
Hexaldehyde	2.00E-01	2.00E-01	2.00E-01	QN	QN	QN	QN	QN
2,5-Dimethylbenzaldehyde	2.00E-01	2.00E-01	2.00E-01	QN	QN	QN	QN	Q.
TO-14 VOCs (extended list)								
Propene	6.54E-02	6.54E-02	1.72E-03	6.90E-08	1.79E-05	3.128E-05	6.083E-10	7.821E-06
Dichlorodiflouromethane	4.45E-03	3.46E-03	3.96E-03	3.83E-10	9.92E-08	1.736E-07	3.375E-12	4.339E-08
Chlorodifluoromethane	3.54E-03	3.54E-03	3.54E-03	QN	QN	QN	QN	QN
Freon 114	6.99E-03	6.99E-03	6.99E-03	QN	QN	QN	Q	QN
Chloromethane	1.24E-03	1.45E-03	1.45E-03	3.08E-11	7.98E-09	1.397E-08	2.717E-13	3.493E-09
Vinyl Chloride	2.56E-03	2.56E-03	2.56E-03	ND	QN	QN	Ð	QN
1,3-Butadiene	1.11E-02	1.11E-02	2.21E-03	1.20E-08	3.10E-06	5.421E-06	1.054E-10	1.355E-06
Bromomethane	3.88E-03	3.88E-03	3.88E-03	Q.	2	QN	QN	Q.
Chloroethane	2.64E-03	2.64E-03	2.64E-03	QN	Q.	ND	Ω	Q
	1							

				200	אמושלע	I Otal Mass	The second secon	
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Substance	Emission
Compound	Actual	Actual	Background	Emission	Emission	Emitted	Concentration	Rate
	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams/item)	(grams/m³)	(g/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)	(Ib./Ib. NEW)		CONC	er.
Dichlorofluoromethane	4.21E-03	4.21E-03	4.21E-03	QN	QN	QN.	QN	QN
Trichloroflouromethane	1.69E-03	1.69E-03	1.69E-03	1.65E-10	4.27E-08	7.480E-08	1.455E-12	1.870E-08
Pentane	2.36E-03	2.36E-03	2.95E-03	ON	QN	QN	QN	ND
Acrolein	5.27E-02	2.29E-02	2.29E-03	4.07E-08	1.06E-05	1.848E-05	3.593E-10	4.620E-06
1,1-Dichlorethene	4.05E-03	4.05E-03	4.05E-03	QN	QN	QN	QN	QN
Freon 113	7.68E-03	7.68E-03	7.68E-03	QN	QN	QN	QN	QN
Acetone	1.90E-02	1.66E-02	2.14E-02	QN	QN	QN	QN	ND
Methyl lodide	5.81E-03	5.81E-03	5.81E-03	QN	QN	QN	QN	QN
Carbon Disulfide	3.11E-03	3.11E-03	3.11E-03	ND	GN	ND	QV	ND
Acetonitrile	1.36E-01	1.34E-01	1.68E-03	1.46E-07	3.78E-05	6.623E-05	1.288E-09	1.656E-05
3-Chloropropene	3.13E-03	3.13E-03	3.13E-03	QN	QN	QN	QV	QN
Methylene Chloride	3.23E-01	2.33E-01	2.43E-01	6.09E-08	1.58E-05	2.763E-05	5.373E-10	6.908E-06
tert-Butyl Alcohol	3.03E-03	3.03E-03	3.03E-03	ND	QN	QN	QN	Q
Acrylonitrile	4.34E-02	4.56E-02	2.17E-03	4.81E-08	1.25E-05	2.181E-05	4.240E-10	5.451E-06
trans-1,2-Dichloroethene	3.96E-03	3.96E-03	3.96E-03	ON	QN	QN	QN	QN
Methyl t-Butyl Ether	2.16E-03	2.16E-03	3.24E-03	ND	QN	QN	QN	QN ON
Hexane	2.11E-03	1.76E-03	2.82E-03	QN	QN	QN	QN	Q
1,1-Dichloroethane	3.97E-03	3.97E-03	3.97E-03	Q	Q	QN	ND	ON
Vinyl Acetate	3.52E-03	3.52E-03	3.52E-03	QN	QN	QN	QN	QN
cis-1,2-Dichloroethene	3.96E-03	3.96E-03	3.96E-03	ND	QN	ON	ΩN	QV
2-Butanone	2.95E-03	2.95E-03	2.06E-03	1.16E-09	3.00E-07	5.252E-07	1.021E-11	1.313E-07
Ethyl Acetate	1.80E-02	2.52E-02	3.60E-03	2.34E-08	6.06E-06	1.061E-05	2.063E-10	2.653E-06
Methyl Acrylate	3.52E-03	3.52E-03	3.52E-03	ON	QN	QN	QN	N
Chloroform	4.88E-03	4.88E-03	4.88E-03	ND	Q.	QN	ON	QN
1,1,1-Trichloroethane	5.46E-03	5.46E-03	5.46E-03	QN	QN	QN	QN	QN
Carbon Tetrachloride	6.29E-03	6.29E-03	6.29E-03	QN	QN	QN	QN	QN
1,2-Dichlorethane	8.09E-03	8.09E-03	4.05E-03	8.75E-09	2.27E-06	3.967E-06	7.714E-11	9.917E-07
Benzene	5.11E-01	5.43E-01	1.28E-03	5.68E-07	1.47E-04	2.578E-04	5.014E-09	6.446E-05
Isooctane	4.67E-03	4.67E-03	9.34E-04	QN	QN	QN	QV	QN
Heptane	8.20E-04	4.10E-03	8.20E-04	7.29E-11	1.89E-08	3.306E-08	6.429E-13	8.266E-09
Trichloroethane	4.88E-03	4.88E-03	4.88E-03	ND	QN	QN	Q	QN
Ethyl Acrylate	4.09E-03	4.09E-03	4.09E-03	QN	QN	QN	QN	QN
1,2-Dichloropropane	4.62E-03	4.62E-03	4.62E-03	ON	QN	QN	QV	QN
Methyl Methacrylate	4.09E-03	4.09E-03	4.09E-03	QN	QN	QN	ON	Q.
Dibromomethane	7.11E-03	7.11E-03	7.11E-03	QN	QN	ND	QN	Q.

Table B-2: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 200 meter location

	Trial #1B	Trial #2B	Daily	Average	Average	Total Mass		Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Substance	Emission
Compound	Actual	Actual	Background	Emission	Emission	Emitted	Concentration	Rate
	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams/item)	(grams/m ³)	a/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)	(Ib./Ib. NEW)	X	CONC	ER,
1,4-Dioxane	3.60E-03	3.60E-03	3.60E-03	QN	QN	QN	QN	QN
Bromodichloromethane	6.70E-03	6.70E-03	6.70E-03	Ð	QV	QN	QN	Q
cis-1,3-Dichloropropene	4.54E-03	4.54E-03	4.54E-03	QN	Q	QN	QN	Q
4-Methyl-2-Pentanone	4.10E-03	4.10E-03	4.10E-03	QN	Q	Q	QN	QN
Toluene	2.64E-02	2.64E-02	2.64E-03	2.59E-08	6.71E-06	1.175E-05	2.285E-10	2.938E-06
Octane	4.67E-03	4.67E-03	4.67E-03	QN	QN	QN	QN	Q.
trans-1,3-Dichloropropene	4.54E-03	4.54E-03	4.54E-03	QN	QN	QN	QN	Q
Ethyl Methacrylate	4.67E-03	4.67E-03	4.67E-03	QN	QV	QN	QN	Q
1,1,2-Trichloroethane	5.46E-03	5.46E-03	5.46E-03	QN	Q	QN	QN	QN
Tertrachloroethene	6.78E-03	6.78E-03	6.78E-03	Q	QV	QN	QN	Q
2-Hexanone	4.10E-03	4.10E-03	4.10E-03	QN	QN	QN	QN	Q
Dibromochloromethane	8.52E-03	8.52E-03	8.52E-03	QN	QN	QN	QN	QN
1,2-Dibromoethane	7.68E-03	7.68E-03	7.68E-03	QN	Q	QN	QN	QN
Chlorobenzene	4.60E-03	4.60E-03	4.60E-03	QN	QN	QN	QN	Q.
1,1,1,2-Tetrachloroethane	6.87E-03	6.87E-03	6.87E-03	QN	Q	QN	QN	QN
Ethylbenzene	4.34E-03	3.47E-03	4.34E-03	QN	QN	ON	QN	QN
m/p-Xylene	1.30E-02	1.30E-02	2.17E-02	QN	QN	QN	QN	QN
o-Xylene	1.30E-02	1.30E-02	2.17E-02	ΩN	QN	QN	QN	QN
Styrene	8.52E-03	8.52E-03	4.26E-03	9.21E-09	2.39E-06	4.175E-06	8.119E-11	1.044E-06
Bromoform	1.03E-02	1.03E-02	1.03E-02	QN	ND	QN	QN	QN
Cumene	4.92E-03	4.92E-03	4.92E-03	ΩN	QN	QN	QN	QN
1,1,2,2-Tetrachlorethane	6.87E-03	6.87E-03	6.87E-03	QN	ND	QV	QN	QN
1,2,3-Trichloropropane	6.03E-03	6.03E-03	6.03E-03	QN	QN	QV	QN	QN
Bromobenzene	6.42E-03	6.42E-03	6.42E-03	QN	QN	QN	QN	QN
4-Ethyltoluene	2.46E-03	2.46E-03	2.95E-03	Q	QN	ON	QN	Q
1,3,5-Trimethylbenzene	1.97E-03	1.97E-03	2.46E-03	QN	QN	QN	Q	S
Alpha Methyl Styrene	4.83E-03	4.83E-03	4.83E-03	QN	QN	ND	QN	Q
1,2,4-Trimethylbenzene	4.92E-03	4.92E-03	9.83E-03	QN	ND	ND	QN	Q.
1,3-Dichlorobenzene	6.01E-03	6.01E-03	6.01E-03	ΩN	QN	QN	Q	Q
1,4-Dichlorobenzene	6.01E-03	6.01E-03	6.01E-03	ND	DN	QN	QN	Q
Benzyl Chloride	5.18E-03	5.18E-03	5.18E-03	Ω	QN	QN	ON	Q
1,2-Dichlorobenzene	6.01E-03	6.01E-03	6.01E-03	Ω	QN	QN	QN	Ω
Hexachlorethane	9.68E-03	9.68E-03	9.68E-03	Q	QN	ND	QN	Q
1,2,4-Trichlorobenzene	7.42E-03	7.42E-03	7.42E-03	S	2	Q.	QN	CZ

Table B-2: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 200 meter location

	Trial #1B	Trial #2B	Daily	Average	Average	Total Mass		Substance
	Measured	Measured	Measured	Adjusted	Adjústed	of Substance	Substance	Emission
Compound	Actual	Actual	Background	Emission	Emission	Emitted	Concentration	Rate
	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams/item)	(grams/m³)	(g/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb://tem)	(lb./lb, NEW)		CONC	ER,
Hexachlorobutadiene	1.07E-02	1.07E-02	1.07E-02	QN	ND	QN	QV	QN
Hydrocarbons								
Methane	9.84E+00	9.18E+00	9.84E-01	9.91E-06	2.57E-03	4.494E-03	8.738E-08	1.123E-03
Ethylene	4.93E-01	4.85E-01	2.87E-02	5.59E-07	1.45E-04	2.537E-04	4.933E-09	6.343E-05
Acetylene	6.39E-02	6.60E-02	2.56E-02	7.43E-08	1.92E-05	3.369E-05	6.551E-10	8.422E-06
Ethane	2.48E-01	2.50E-01	2.95E-02	2.85E-07	7.38E-05	1.291E-04	2.511E-09	3.228E-05
Propylene	8.26E-02	8.78E-02	4.13E-02	9.74E-08	2.52E-05	4.418E-05	8.590E-10	1.104E-05
Propane	4.33E-02	4.33E-02	4.33E-02	QN	Q	QN	Q	QN
Propyne	3.84E-02	3.84E-02	3.84E-02	QN	Q.	QN	Q	QN
Isobutane	5.47E-02	5.47E-02	5.47E-02	QN	QN	QN	Q	QN
1-Butene/Isobutylene	1.08E-01	1.08E-01	1.08E-01	QN	QN	QN	2	QN
1,3-Butadiene/butane	1.65E-01	1.65E-01	1.65E-01	QN	QN	QN	S	QN
cis-butene	5.51E-02	5.51E-02	5.51E-02	QN	QN	QN	Q	QN
1-Butyne/trans-butene	1.06E-01	1.06E-01	1.06E-01	QN	QN	QN	Q	QN
2-Butyne	5.31E-02	5.31E-02	5.31E-02	QN	QN	QN	Q	QN
n-Pentane	7.08E-02	7.08E-02	7.08E-02	ND	QN	ON	2	QN
п-Нехапе	7.75E-02	7.75E-02	7.75E-02	QN	QN	ND	2	Q
SVOCs (8270 List)								100 CA 100 CA
N-nitrosodimethylamine	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	Q	QN
Bis(2-chloroethyl)ether	1.78E-02	1.78E-02	1.81E-02	QN	ND	QN	Q.	QN
Phenol	1.78E-02	1.78E-02	1.81E-02	QN	ON	QN	S	QN
2-chlorophenol	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	Q	QN
1,3-dichlorobenzene	1.78E-02	1.78E-02	1.81E-02	QN	QN	ON	Q	QN
1,4-dichlorobenzene	1.78E-02	1.78E-02	1.81E-02	QN	QN	ON	QN	Q
1,2-dichlorobenzene	1.78E-02	1.78E-02	1.81E-02	Q	ND	ON	QN	Q
Benzyi alcohol	1.78E-02	1.78E-02	1.81E-02	Q	ND	ON	QN	QN
Bis(2-chloroisopropyl)ether	1.78E-02	1.78E-02	1.81E-02	Q	ND	ON	QN	ΩN
2-methylphenol	1.78E-02	1.78E-02	1.81E-02	QN	ND	QN	Q	QN
Hexachloroethane	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	2	Q.
N-nitroso-di-n-propylamine	1.78E-02	1.78E-02	1.81E-02	QN	ND	QN	Q.	QN
4-methylphenol	1.78E-02	1.78E-02	1.81E-02	ND	QN	QN	2	QN
Nitrobenzene	1.78E-02	1.78E-02	1.81E-02	ND	QN	QN	Q	QV
Isaphorone	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	Q	QN
2-nitrophenol	1.78E-02	1.78E-02	1.81E-02	QN	ND	ND	QN	QN

Table B-2: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 200 meter location

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	Trial #1B	Trial #2B	Daily	Average	Average	Total Mass		Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Substance	Emission
Compaund	Actual	Actual	Background	Emission	Emission	Emitted	Concentration	Rate
	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams//tem)	(grams/m ³)	(a/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)	(Ib./Ib. NEW)		CONC	ER,
2,4-dimethylphenol	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	S	QN
Bis(2-chloroethoxy)methane	1.78 E -02	1.78E-02	1.81E-02	Q.	QN	QN	QV	CN
2,4-dichlorophenol	1.78E-02	1.78E-02	1.81E-02	Ω	QN	NO.	QN	CN
1,2,4-trichlorobenzene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QV.	QN	2 2
Naphthalene	1.12E-02	1.30E-02	1.81E-02	1.31E-08	3.39E-06	5.929E-06	1.153E-10	1 482E-06
4-chloroaniline	1.78E-02	1.78E-02	1.81E-02	Q	QV	QN	CN	
Hexachlorobutadiene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	2
4-chloro-3-methylphenol	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN.	QN	Q
2-methylnaphthalene	1.78E-02	1.78E-02	1.81E-02	QN	QV	QN	QN	S
Hexachlorocyclopentadiene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	Q
2,4,6-trichlorophenol	1.78E-02	1.78E-02	1.81E-02	QN	Q	ΩN	QN	QN
2,4,5-trichlorophenol	1.78E-02	1.78E-02	1.81E-02	QN	Q	QN	QN	QN
2-chloronaphthalene	1.78E-02	1.78E-02	1.81E-02	QN	QN	ON	QN	Q
2-nitroaniline	1.78E-02	1.78E-02	1.81E-02	Q	QN	QN	QN	S
Acenaphthylene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	S
Dimethylphthalate	1.78E-02	1.78E-02	1.81E-02	Q	QN	ND	QN	S
2,6-dinitrotoluene	1.78E-02	1.78E-02	1.81E-02	Q	QN	QN	QN	C N
Acenaphthene	1.78E-02	1.78E-02	1.81E-02	Q	QN	ΩN	QN	S
3-nitroaniline	3.55E-02	3.56E-02	3.62E-02	Q	QN	QN	QN	CX
2,4-dinitrophenol	3.55E-02	3.56E-02	3.62E-02	QN	QN	QN	QN	CZ
Dibenzofuran	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
2,4-dinitrotoluene	1.78E-02	1.78E-02	1.81E-02	ND	QN	QN	QN	QN
4-nitrophenol	3.55E-02	3.56E-02	3.62E-02	QN	QN	ND	QN	QN
Fluorene	1.78E-02	1.78E-02	1.81E-02	Q	ND	ND	QN	N
4-cnlorophenyl-phenylether	1.78E-02	1.78E-02	1.81E-02	Q	ND	QN	2	QN
Dietnylphthalate	1.78E-02	1.78E-02	1.81E-02	ND	ND	QN	Q	QN
4-nitroaniline	3.55E-02	3.56E-02	3.62E-02	ND	QN	QN	Q	QN
4,6-dinitro-2-methylphenol	3.55E-02	3.56E-02	3.62E-02	ΩΩ	QN	QN	Q	QN
N-nitrosodiphenylamine(1)	1.78E-02	1.78E-02	1.81E-02	ΩN	ND	ND	QN	QN
4-bromophenyl-phenylether	1.78E-02	1.78E-02	1.81E-02	Q.	ND	QN	Q	ND
нехаспоровидене	1.78E-02	1.78E-02	1.81E-02	Q	ND	QN	Q	2
Pentachlorophenol	3.55E-02	3.56E-02	3.62E-02	ND	QN	QN	QV	2
Phenanthrene	1.78E-02	1.78E-02	1.81E-02	Q	QN	QN	QN	Q
Anthracene	1.78E-02	1.78E-02	1.81E-02	ND	QN	ND	QN	ND ND
UI-n-butylphthalate	1.78E-02	1.10E-02	1.81E-02	2.58E-07	6.67E-05	1.168E-04	2.271E-09	2.920E-05

Compound	Trial #1B Measured Actual	Trial #2B Measured Actual	Daily Measured Background	Average Adjusted Emission	Average Adjusted Emission	Total Mass of Substance Emitted	Substance Concentration	Substance Emission Rate
	Concentration (mg/m ³)	Concentration (mg/m³)	Concentration (mg/m³)	Factor (EF)	Factor (lb./lb:\NEW)	(grams/item) M	(grams/m²) conc	(g/item)/sec ER,
Fluoranthene	1.78E-02	1.78E-02	1.81E-02	QN	QN	ND CONTRACTOR OF THE CONTRACTO	QN	QN
Pyrene	1.78E-02	1.78E-02	1.81E-02	QN	Q	QN	QN	QN
Butylbenzylphthalate	1.78E-02	1.78E-02	1.81E-02	QV	QN	QŅ	QN	Q
Benzo(a)anthracene	1.78E-02	1.78E-02	1.81E-02	Q	2	QN	S	2
Chrysene	1.78E-02	1.78E-02	1.81E-02	Q	2	QN	QN	Q
Bis(2-ethylhexyl)phthalate	6.04E-02	5.51E-02	6.52E-02	8.43E-07	2.18E-04	3.823E-04	7.434E-09	9.558E-05
Di-n-octylphthalate	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	Q	Ð
Benzo(b)fluoranthene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	Q	Q
Benzo(k)fluoranthene	1.78E-02	1.78E-02	1.81E-02	QN	2	QN	Q	S
Benzo(a)pyrene	1.78E-02	1.78E-02	1.81E-02	QN	Q.	QN	Q	QV
Indeno(1,2,3-cd)pyrene	1.78E-02	1.78E-02	1.81E-02	Q	Q	QN	9	2
Dibenz(a,h)anthracene	1.78E-02	1.78E-02	1.81E-02	QN	Q	QN	Q	Q
Benzo(g,h,i)perylene	1.78E-02	1.78E-02	1.81E-02	QN	Ð	Q	QV	QN
TO-13 PAHS								
Naphthalene	9.07E-03	1.05E-02	2.72E-04	1.03E-08	2.67E-06	4.674E-06	9.090E-11	1.169E-06
Acenaphthylene	4.27E-04	5.34E-04	1.81E-05	5.19E-10	1.35E-07	2.355E-07	4.579E-12	5.887E-08
Acenaphthene	8.00E-05	8.72E-05	2.17E-05	6.90E-11	1.79E-08	3.129E-08	6.084E-13	7.822E-09
Fluorene	2.49E-04	2.85E-04	3.08E-05	2.58E-10	6.69E-08	1.171E-07	2.276E-12	2.927E-08
Phenanthrene	3.02E-04	3.91E-04	9.23E-05	2.84E-10	7.37E-08	1.290E-07	2.508E-12	3.224E-08
Anthracene	4.44E-05	5.51E-05	1.81E-05	5.38E-11	1.40E-08	2.442E-08	4.749E-13	6.105E-09
Fluoranthene	2.84E-04	3.74E-04	3.26E-05	3.24E-10	8.39E-08	1.469E-07	2.856E-12	3.672E-08
Pyrene	7.29E-04	9.61E-04	3.08E-05	8.83E-10	2.29E-07	4.007E-07	7.791E-12	1.002E-07
Benzo(a)anthracene	1.37E-04	1.78E-04	1.81E-05	1.70E-10	4.41E-08	7.720E-08	1.501E-12	1.930E-08
Chrysene	1.55E-04	2.13E-04	1.81E-05	1.99E-10	5.16E-08	9.031E-08	1.756E-12	2.258E-08
Benzo(b)fluoranthene	1.78E-04	2.49E-04	1.81E-05	2.31E-10	5.98E-08	1.047E-07	2.036E-12	2.618E-08
Benzo(k)fluoranthene	9.24E-05	1.41E-04	1.81E-05	1.26E-10	3.27E-08	5.718E-08	1.112E-12	1.429E-08
Benzo(e)pyrene	2.13E-04	2.85E-04	1.81E-05	2.69E-10	6.98E-08	1.221E-07	2.375E-12	3.054E-08
Benzo(a)pyrene	1.78E-04	2.49E-04	1.81E-05	2.31E-10	5.98E-08	1.047E-07	2.036E-12	2.618E-08
Indeno(1,2,3-cd)pyrene	1.53E-04	2.13E-04	1.81E-05	1.98E-10	5.14E-08	8.988E-08	1.748E-12	2.247E-08
Dibenz(a,h)anthracene	1.78E-05	2.49E-05	1.81E-05	2.71E-11	7.03E-09	1.230E-08	2.393E-13	3.076E-09
Benzo(g,h,i)perylene	6.04E-04	9.61E-04	1.81E-05	8.47E-10	2.19E-07	3.842E-07	7.470E-12	9.604E-08
Dioxins and Furans								
2378-TCDD	3.70E-10	3.80E-10	3.51E-10	4.35E-16	1.13E-13	1.974E-13	3.838E-18	4.935E-14
12378-PECDD	6.89E-10	5.94E-10	7.22E-10	QN	QV	QN	Q	Q

5/4/2001

Table B-2: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 200 meter location

	Trial #1B	Trial #2B	Daily	Average	Average	Total Mass		Cubatona
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Substance	Emission
Compound	Actual	Actual	Background	Emission	Emission	Emitted	Concentration	Rate
	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams/item)	(grams/m ³)	(a/item)/sec
	(mg/m ₃)	(mg/m³)	(mg/m³)	(lb./item)	(Ib:/IbNEW)	M	CONC	ER,
123478-HXCDD	3.28E-10	2.72E-10	3.31E-10	QN	QN	SN SN	QN	CZ
123678-HXCDD	3.46E-10	2.90E-10	3.39E-10	QN	QN	QN.	S	S
123789-HXCDD	3.17E-10	2.64E-10	3.15E-10	QN	QN	ND	QV.	S
1234678-HPCDD	3.13E-09	3.64E-09	1.98E-09	1.92E-15	4.99E-13	8.730E-13	1 698F-17	2 183E-13
ocpp	2.31 E- 08	2.59E-08	1.48E-08	1.35E-14	3.50E-12	6.121E-12	1 190F-16	1 530E-12
2378-TCDF	5.71E-10	5.28E-10	8.60E-10	QN	QN	QN	CN	NID NID
12378-PECDF	6.10E-10	5.66E-10	6.63E-10	QN	QN	QN	S	
23478-PECDF	4.55E-10	4.20E-10	5.01E-10	QN	QN	QN	2 2	2 5
123478-HXCDF	5.20E-10	5.50E-10	5.40E-10	8.10E-17	2.10E-14	3.676E-14	7 148F-19	0 1015 15
123678-HXCDF	4.44E-10	3.97E-10	4.38E-10	QN	Q	QN	CN.	9.191E-13
123789-HXCDF	2.22E-10	1.85E-10	2.11E-10	QN	QN	QN	2 2	2 2
234678-HXCDF	3.10E-10	2.61E-10	3.10E-10	Q	QN	CN	2 2	2 2
1234678-HPCDF	9.10E-10	1.14E-09	7.50E-10	4.35E-16	1.13E-13	1.973E-13	3 837E-18	4 034E-14
1234789-HPCDF	4.62E-10	4.70E-10	4.33E-10	QN	QN	CN	NO.	4:334C-14
OCDF	2.00E-09	1.09E-09	1.57E-09	2.23E-16	5.77E-14	1.010E-13	1.964E-18	2 525E-14
Energetics								1-1070:3
Nitrobenzene	2.00E+00	2.00E+00	AN	QN	QN	CZ	ON CONTRACT	2
2-Nitrotoluene	2.00E+00	2.00E+00	ΑN	QN	QN	CN	Q Q	2 2
3-Nitrotoluene	2.00E+00	2.00E+00	AN	QN.	QN			S S
4-Nitrotoluene	2.00E+00	2.00E+00	AN	QN	QN	2 2	2 2	2 2
Nitroglycerine	2.00E+00	2.00E+00	AN	QN	S.	CZ	2 2	2 2
1,3-Dinitrobenzene	2.00E+00	2.00E+00	ΑΝ	QN	Q	QN	CZ	2 2
2,6-Dinitrotoluene	2.00E+00	2.00E+00	AN	QN	Q.	QN	S	2 2
2,4-Dinitrotoluene	2.00E+00	2.00E+00	AN	Q	QN	Q	QV	
1,3,5-Trinitrobenzene	2.00E+00	2.00E+00	NA	QN	Q	QN	QN	QN
2,4,6- I rinitrotoluene	2.00E+00	2.00E+00	NA	ON	QN	QN	QN	CN
RDX	2.00E+00	2.00E+00	NA	ND	Q	QN	QN	QN
4-Amino-z, o-Ulnitrotoluene	2.00E+00	2.00E+00	ΑN	QN	ND	QN	QN	QN.
Z-Amino-4, 5-Dinitrotoluene	2.00E+00	2.00E+00	AA A	QN	QN	QN	QV	S.
letryl	2.00E+00	2.00E+00	Ϋ́	QN	ND	QN	QN	QN
NIV.	4.00E+00	4.00E+00	ΑN	ΩN	ΩN	QN	QN	QN
Pentaerythritoitetranitrate	4.00E+00	4.00E+00	AN A	Q.	QN	QN	QN	QN
Dibutyl phthalate	5.00E+01	5.00E+01	ΑN	Q	QN	QN	QN	QN
Cioctyl phthalate	5.00E+01	5.00E+01	ΔX	CIN	2			

	Trial #1B	Trial #2B	Daily	Average	Average	Total Mass		Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Substance	Emission
Compound	Actual	Actual	Background	Emission	Emission	Emitted	Concentration	Rate
	Concentration	Concentration	Concentration Concentration	Factor (EF)	Factor	(grams/item)	(grams/m³)	(a/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb://tem)	(lb./lb. NEW)		SONOS	ER,
Diphenylamine	5.00E+01	5.00E+01	ΝΑ	S	QN	QN	QN	CN
Footnotes:								

'ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emission Study) NA = Not Applicable ND = Not Detected

Table B-3: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 300 meter location

Trial #7B				the control of the co	の 10 mm 大大 10 mm 大	できる。これは本ののでは、またいことの様		が	round
Trial #18 Trial #25 Trial #18 Trial #25 Tri		Number of items.	s: Trial #18 =>		Trial #2B =>	1.5	release duration (t);	7	spuopes
Trial #18 Tria		Ž	et Explosive Wei	ght - N.E.W. per	'Item (lbs.) =>	3:86E-03	Unit Concentration (UC):	4.236E-05	(s/g)/, m/g
Trial #18 Trial #28 Pally Average Average Gridshinson Average Average Gridshinson Gridshinson Actual Actu			ATC FIR	ng Test Resu	181				
Measured Accompound,		Trial #1B	Trial #2R	Section Daily Sees	Average	Acceptan			
Compound. Compound. Consentation (massing) Inflication (massing) Adjustance (massing) Adjustance (massing) Concentration (massing) Concentrat		Manettrad	Modernood			ייייייייייייייייייייייייייייייייייייייי	TOTAL MASS	Substance	Substance
Compound Actual Background Emission Emission Emitted Compound Actual Concentration C		D D D D D D D D D D D D D D D D D D D	Measured	IMEASUred	Adjusted	Adjusted	of Substance	Concentration	Emission
Compound. Concentration Concentratio		Actual	Actual	Background	Emission	Emission	Emitted		Rate
emtGases (mg/m³) <	Сотроина	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams/item)	(grams/m³)	(n/item\/sec
March Marc		(mg/m³)	(ma/m ₃)	(ma/m³)	(meil//gl)	(Ib./Ib. NEW)		UNCO	E E
September Sept	Permanent Gases	老年 人名英格兰人名					A CONTRACTOR OF THE CONTRACTOR		7
Size Color	Ammonia (NH.)	2 885101	2 285 104	VIV	1010			On the Control of the	
Maritacie 1.05E+01	Ochoco Diovido	2.001.01	2.305.101	YN.	2.48E-UD	6.42E-U3	1.123E-02	1.189E-07	2.808E-03
Monicale (CU) 1,88E+03 1,88E+03 NA 1,81E-03 4,99E-01 8,208E-01 8,529E-06 oxide (SO ₂) 5,24E-01 5,24E-01 5,24E-01 2,20E-01 ND ND ND ND In Source 2,20E-01 2,20E-01 2,20E-01 2,20E-01 2,0E-01 0,0E-01 0,0D ND ND ND In Source 2,20E-01 2,20E-01 2,20E-01 2,20E-01 2,0E-01 0,0D ND ND ND In Source 1,30E-02 1,30E-02 1,30E-02 1,30E-02 1,30E-02 1,40E-03 1,40E-03 1,40E-03 1,40E-0	Caliborate (CO2)	9.79E+UZ	9.90E+02	ΝΑ	9.67E-04	2.51E-01	4.388E-01	4.647E-06	1.097E-01
Name	Carbon Monoxide (CO)	1.85E+03	1.84E+03	NA	1.81E-03	4.69E-01	8.208E-01	8.692E-06	2.052E-01
Oxide (SO ₂) 5.24E-01 5.24E-01 LAB ND ND ND ND Registe 2.20E-01 ND ND ND ND Acid 2.20E-01 2.20E-01 2.20E-01 2.20E-01 2.20E-01 ND ND </td <td>Oxides of Nitrogen (NO_x)</td> <td>1.05E+01</td> <td>1.19E+01</td> <td>NA</td> <td>1.10E-05</td> <td>2.85E-03</td> <td>4.988E-03</td> <td>5.283E-08</td> <td>1.247E-03</td>	Oxides of Nitrogen (NO _x)	1.05E+01	1.19E+01	NA	1.10E-05	2.85E-03	4.988E-03	5.283E-08	1.247E-03
National	Sulfur Dioxide (SO ₂)	5.24E-01	5.24E-01	AN	QN	Q.	QN	CN	CN
n Fluoride 2.20E-01 2.20E-01 2.20E-01 2.20E-01 2.20E-01 2.20E-01 2.20E-01 2.20E-01 2.10E-01 0.0D ND ND <td>Acid Gases</td> <td></td> <td>Commence of the property of the commence of th</td> <td>The second second second</td> <td></td> <td>がはいるないできる</td> <td></td> <td></td> <td></td>	Acid Gases		Commence of the property of the commence of th	The second second second		がはいるないできる			
n Chloride 2.20E-01 2.20E-01 2.10E-01 ND ND ND ND Acid 2.20E-01 2.20E-01 2.10E-01 2.10E-01 ND ND ND ND ND Acid 2.20E-01 2.20E-01 2.10E-01 ND ND ND ND ND Acid 2.20E-01 2.20E-01 2.10E-01 ND ND ND ND ND Acid 2.20E-01 2.20E-01 2.10E-01 ND <	Hydrogen Fluoride	2.20F-01	2 20E-01	2 20E 01	CIV			Section State But and Section Section	Section of the second section of the second
NEW Particle	Hydrogen Chloride	2 200 04	20000	2.205-01	2		ON	Q	ND
National	Policilo liagon (1)	2.205-01	Z.ZUE-U1	Z.10E-01	QN	Q	ON	QN	QN
ric Acid 2.20E-01 2.20E-01 2.10E-01 2.10E-01 ND ND ND ND Acid 2.20E-01 2.20E-01 2.10E-01 2.10E-01 0.10E-01 ND ND ND ND Acid 2.20E-01 2.20E-01 2.10E-01 2.10E-01 1.30E-02 1.30E-02 1.49E-08 3.85E-06 6.741E-06 7.13E-17 In Cyanide 1.88E+01 2.00E+01 2.70E-02 2.23E-05 5.79E-03 1.013E-02 1.073E-07 spended Particulate 3.86E+01 2.70E-01 2.70E-02 2.23E-05 5.79E-03 1.013E-02 1.073E-07 th Matter <10 microns	Hyarogen Bromide	2.10E-01	2.10E-01	2.10E-01	Q	Q	QN	Q	QN
Acid 2.20E-01 2.10E-01 2.10E-01 2.10E-01 ND <	Nitric Acid	2.20E-01	2.20E-01	2.10E-01	Q	S	QX	CN	S
Acid 2.20E-01 2.20E-01 2.10E-01 2.10E-01 ND ND ND ND te Cyanide 1.30E-02 1.30E-02 1.30E-02 1.30E-02 1.30E-03 1.013E-06 7.139E-11 n Cyanide 1.88E+01 2.03E+01 2.70E-02 2.23E-05 5.79E-03 1.013E-02 1.073E-07 spended Particulate 3.86E+01 3.86E+01 2.70E-02 2.23E-05 1.14E-02 1.99E-02 2.17E-07 te Matter <10 microns 3.86E+01 3.76E+01 NA 4.41E-05 1.14E-02 1.99E-02 2.03E-07 te Matter <2.5 microns 2.90E+01 2.82E+01 NA 3.27E-05 8.46E-03 1.026E-02 1.56E-07 n 2.670E-01 3.033E-01 1.027E-01 2.26E-07 8.46E-03 1.026E-04 1.087E-09 n 1.380E+00 1.47E-02 1.62E-06 4.19E-04 7.30E-04 7.762E-09 n 1.131E-02 1.174E-02 1.49E-03 1.49E-04 7.33E-04 7.76E-09 n	Phosphoric Acid	2.20E-01	2.20E-01	2.10E-01	Q	QN	QN	S	
te Cyanide 1.30E-02 1.073E-02 1.073E-02 1.073E-07	Sulfuric Acid	2.20E-01	2.20E-01	2.10E-01	2	QN	Q	S	2 2
te Cyanide 1.30E-02 1.30E-02 1.30E-02 1.30E-02 1.30E-06 1.30E-06 1.30E-06 1.30E-06 1.30E-06 1.30E-06 1.30E-06 1.30E-06 1.30E-06 1.30E-07	Cyanide		The state of the s			Approximation of the second			2
n Cyanide 1.88E+01 2.70E-02 1.43E-06 5.79E-03 0.741E-06 7.138E-11 spended Particulate 3.86E+01 2.70E-02 2.23E-05 5.79E-03 1.013E-02 1.073E-07 spended Particulate 3.86E+01 2.70E-02 2.23E-05 1.14E-02 1.999E-02 2.17E-07 te Matter <10 microns 3.86E+01 3.76E+01 NA 4.41E-05 1.13E-02 1.999E-02 2.17E-07 te Matter <2.5 microns 2.90E+01 2.82E+01 NA 4.35E-05 1.13E-02 1.599E-02 2.02E-07 n 2.670E-01 3.053E-01 1.02TE-01 2.26E-07 5.86E-05 1.036E-02 1.08E-09 n 1.380E+00 1.44TE-02 1.41E-02 1.65E-04 7.330E-04 7.762E-09 n 1.131E-02 1.174E-02 1.41E-02 1.45E-04 2.534E-04 7.762E-09 n 1.131E-02 1.74E-02 1.41E-02 1.55E-04 2.716E-04 2.76E-09 n 1.131E-02 1.74E-02 1.41E-02 1.55E-0	Particulate Cvanide	1 30F-02	1 30F-02	1 30E-02	1 400 00	2007		A Secretary Secretary Section	
atem 1.03E-01 2.0E-01 2.10E-02 2.10E-02 2.10E-02 1.03E-02 1.03E-02 1.03E-02 1.03E-02 1.03E-02 1.03E-02 1.03E-02 1.03E-02 2.117E-07 3.117E-07 3.117E-07 3.117E-07 3.117E-07 3.117E-07 3.117E-07 3.117E-04	Hydrogen Cyanida	1 88E±01	2 035404	2 705 02	1.49E-00	3.00=-00	6.741E-06	7.139E-11	1.685E-06
m 3.86E+01 NA 4.41E-05 1.14E-02 1.999E-02 2.117E-07 te Matter < 2. 5 microns 3.86E+01 3.76E+01 NA 4.35E-05 1.13E-02 1.999E-02 2.117E-07 te Matter < 2. 5 microns 2.90E+01 2.62E+01 NA 3.27E-05 1.13E-02 1.975E-02 2.092E-07 n 2.670E-01 3.053E-01 1.027E-01 2.26E-07 5.86E-05 1.026E-04 1.087E-09 1 1.380E+00 1.447E+00 1.141E-02 1.62E-06 4.19E-04 7.330E-04 7.762E-09 1 4.843E-01 4.932E-01 1.141E-02 ND ND ND ND 1 1.131E-02 1.774E-02 1.141E-02 5.99E-07 1.45E-04 2.534E-04 2.634E-09 1 1.131E-02 1.774E-02 1.141E-02 ND ND ND ND 1 1.131E-02 1.774E-02 1.141E-02 5.99E-07 1.55E-04 2.716E-04 2.877E-09 1 1.131E-02 1.774E-02 </td <td></td> <td>ויסטרים:</td> <td>Z.03E±01</td> <td>4.70E-02</td> <td>2.23E-05</td> <td>5,79E-03</td> <td>1.013E-02</td> <td>1.073E-07</td> <td>2.532E-03</td>		ויסטרים:	Z.03E±01	4.70E-02	2.23E-05	5,79E-03	1.013E-02	1.073E-07	2.532E-03
Spended Particulate 3.86E+01 3.86E+01 NA 4.41E-05 1.14E-02 1.999E-02 2.17E-07 te Matter <10 microns 3.86E+01 3.76E+01 NA 4.35E-05 1.13E-02 1.975E-02 2.092E-07 te Matter <2.5 microns 2.90E+01 2.82E+01 NA 3.27E-05 8.46E-03 1.481E-02 1.569E-07 n 2.670E-01 3.053E-01 1.027E-01 2.26E-07 5.86E-05 1.026E-04 1.087E-09 n 1.380E+00 1.447E+00 1.141E-02 1.62E-06 4.19E-04 7.330E-04 7.762E-09 n 4.843E-01 4.932E-01 1.141E-02 ND ND ND ND n 1.131E-02 1.174E-02 1.141E-02 5.99E-07 1.45E-04 2.534E-09 ND n 1.131E-02 1.174E-02 1.141E-02 ND ND ND ND n 5.476E-01 5.589E-01 3.424E-02 5.99E-07 1.55E-04 2.716E-04 2.716E-09 n 1.131E-	Faruculate				San San San San				
te Matter < 10 microns 3.86E+01 NA 4.35E-05 1.13E-02 1.975E-02 2.092E-07 te Matter < 2.5 microns 2.90E+01 NA 3.27E-05 8.46E-03 1.481E-02 2.092E-07 n 2.670E-01 3.053E-01 1.027E-01 2.26E-07 5.86E-05 1.026E-04 1.087E-09 n 1.380E+00 1.447E+00 1.141E-02 1.62E-06 4.19E-04 7.330E-04 7.762E-09 1 1.31E-02 1.174E-02 1.141E-02 5.59E-07 1.45E-04 2.534E-04 2.684E-09 n 1.131E-02 1.174E-02 1.141E-02 ND ND ND ND n 1.131E-02 1.174E-02 1.141E-02 ND ND ND ND n 1.131E-02 1.174E-02 1.141E-02 5.99E-07 1.55E-04 2.716E-04 2.877E-09 n 1.131E-02 1.174E-02 1.141E-02 ND ND ND ND n 1.131E-02 1.174E-02 1.141E-02 0.99	Total Suspended Particulate	3.86E+01	3.85E+01	AN	4.41E-05	1.14E-02	1.999E-02	2.117E-07	4 998F-03
te Matter < 2.5 microns 2.90E+01 NA 3.27E-05 8.46E-03 1.481E-02 1.569E-07 n 2.670E-01 3.053E-01 1.027E-01 2.26E-07 5.86E-05 1.026E-04 1.087E-09 n 1.380E+00 1.447E+00 1.141E-02 1.62E-06 4.19E-04 7.330E-04 7.762E-09 1.131E-02 1.174E-02 1.141E-02 5.59E-07 1.45E-04 2.534E-04 2.684E-09 1 1.131E-02 1.174E-02 1.141E-02 ND ND ND ND n 1.131E-02 1.174E-02 1.141E-02 ND ND ND ND n 1.131E-02 1.174E-02 1.141E-02 ND ND ND	Particulate Matter <10 microns	3.86E+01	3.76E+01	ΑN	4.35E-05	1.13E-02	1.975E-02	2 092E-07	4 938F-03
n 2.670E-01 3.053E-01 1.027E-01 2.26E-07 5.86E-05 1.026E-04 1.087E-09 1.380E+00 1.447E+00 1.141E-02 1.62E-06 4.19E-04 7.330E-04 7.752E-09 1.131E-02 1.174E-02 1.141E-02 5.59E-07 1.45E-04 2.534E-04 2.684E-09 1 1.131E-02 1.174E-02 1.141E-02 ND ND ND 1 1.131E-02 1.174E-02 1.141E-02 ND ND ND 1 1.131E-02 1.174E-02 1.141E-02 ND ND ND ND	Particulate Matter <2.5 microns	2.90E+01	2.82E+01	ΑN	3.27E-05	8,46E-03	1.481E-02	1.569F-07	3 704E-03
n 2.670E-01 3.053E-01 1.027E-01 2.26E-07 5.86E-05 1.026E-04 1.087E-09 1.380E+00 1.447E+00 1.141E-02 1.62E-06 4.19E-04 7.330E-04 7.762E-09 1.131E-02 1.174E-02 1.141E-02 5.59E-07 1.45E-04 2.534E-04 2.684E-09 1 1.131E-02 1.174E-02 1.141E-02 ND ND ND ND	Metals								0.101
1.380E+00 1.447E+00 1.141E-02 1.62E-06 4.19E-04 7.330E-04 7.762E-09 1.131E-02 1.174E-02 1.141E-02 1.62E-06 4.19E-04 7.330E-04 7.762E-09 1.131E-02 1.174E-02 1.141E-02 S.59E-07 1.45E-04 2.534E-04 2.684E-09 1 1.131E-02 1.174E-02 1.141E-02 ND ND ND N 1.131E-02 1.174E-02 1.141E-02 ND ND ND	Aluminum	2.670E-01	3.053E-01	1 027E-01	2 26E-07	5 86E_05	1 02E 04	4 0041 00	
1.131E-02 1.174E-02 1.141E-02 ND	Antimony	1 380E+00	1 447E+00	1 144 00	1 62 5 06	3.001-03	1.020E-04	1.08/E-09	2.566E-05
1.131E-02 1.174E-02 1.141E-02 ND	Arenic	1 134 00	1 474 00	1.1416-02	1.62E-Ub	4.19E-04	7.330E-04	7.762E-09	1.832E-04
1.131E-02 1.174E-02 5.59E-07 1.45E-04 2.534E-04 2.684E-09 ND		1.1315-02	1.1/4E-02	1.141E-02	Q	Q	QN	QN	QN
1.131E-02 1.174E-02 1.141E-02 ND	barum	4.843E-01	4.932E-01	1.141E-02	5.59E-07	1.45E-04	2.534E-04	2.684E-09	6.336E-05
1.131E-02 1.174E-02 1.141E-02 ND	Beryllium	1.131E-02	1.174E-02	1.141E-02	QN	QN	QN	QN	CN
n 1.131E-02 1.174E-02 1.141E-02 1.141E-02 ND ND ND ND 1.131E-02 1.174E-02 1.141E-02 ND ND ND ND	Cadmium	1.131E-02	1.174E-02	1.141E-02	2	QV	QN	Q	S
ium 1.131E-02 1.174E-02 1.141E-02 ND	Calcium	5.476E-01	5.589E-01	3.424E-02		1.55E-04	2.716E-04	2.877E-09	6 791E-05
1.131E-02 1.174E-02 1.141E-02 ND ND ND ND	Chromium	1.131E-02	1.174E-02	1.141E-02	Q.	QN	Q	S	NIC
	Cobalt	1.131E-02	1.174E-02	1.141F-02	CN	S	2	2 4	Q.

Table B-3: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 300 meter location

	Trial #1B	Trial #28	Daily	Average	Average	Total Mass	Substance	Substance
Danish	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Concentration	Emission
	Actual	Actual	Background	Emission	Emission	Emilled	mate the	Rate
Compound	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams/item)	(grams/m³)	(g/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)	(Ib./Ib.:NEW)		CONC	ER,
Copper	1.358E+01	1.437E+01	1.141E-02	1.60E-05	4.14E-03	7.247E-03	7.675E-08	1.812E-03
Lead	6.359E+00	5.754E+00	1.141E-02	6.92E-06	1.79E-03	3.140E-03	3.325E-08	7.850E-04
Magnesium	8.373E-02	7.750E-02	1.141E-02	9.22E-08	2.39E-05	4.180E-05	4.426E-10	1.045E-05
Manganese	1.131E-02	1.174E-02	1.141E-02	QN	QN	QN	QX	QN
Nickel	1.131E-02	1.174E-02	1.141E-02	Q	QN	Q	QN	QN
Selenium	1.131E-02	1.174E-02	1.141E-02	1.34E-08	3.48E-06	6.100E-06	6.459E-11	1.525E-06
Silver	1.131E-02	1.174E-02	1.141E-02	QN	QN	Q	QN	QN
Thallium	1.131E-02	1.174E-02	1.141E-02	QN	QN	QN	Q	Q
Vanadium	1.131E-02	1.174E-02	1.141E-02	QN	QN	QN	QN	Q
Zinc	1.892E+00	1.935E+00	1.141E-02	2.19E-06	5.67E-04	9.922E-04	1.051E-08	2.481E-04
TO-11 Carbonyls			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.	The state of the state of			
Formaldehyde	3.70E-01	3.70E-01	2.00E-01	4.23E-07	1.10E-04	1.919E-04	2.032E-09	4.796E-05
Acetaldehyde	3.90E-01	3.50E-01	1.60E-01	2.66E-07	6.89E-05	1.205E-04	1.276E-09	3.013E-05
Acetone	3.10E+00	3.10E+00	3.24E+00	3.60E-07	9.34E-05	1.635E-04	1.731E-09	4.086E-05
Acrolein	2.00E-01	2.00E-01	2.00E-01	ON	QN	QN	QN	QN
Proprionaldehyde	2.00E-01	2.00E-01	2.00E-01	ND	QN	QN	QN.	Q
Crotonaldehyde	2.00E-01	2.00E-01	2.00E-01	ND	ND	QN	QN	QN
Butyraldehyde	2.00E-01	2.00E-01	2.00E-01	Ω	ND	QN	QN	QN
Benzaldehyde	2.00E-01	2.00E-01	2.00E-01	ND	ND	QN	QN	QN
Isovaleraldehyde	2.00E-01	2.00E-01	2.00E-01	ND	QN	QN	QN	QN
Valeraldehyde	2.00E-01	2.00E-01	2.00E-01	ON	QN	QN	Q	QN
o,m,p-Tolualdehyde	6.00E-01	6.00E-01	6.00E-01	ND	QN	QV	QN	QN
Hexaldehyde	2.00E-01	2.00E-01	2.00E-01	Q	QN	QN	QN	QN
2,5-Dimethylbenzaldehyde	2.00E-01	2.00E-01	2.00E-01	ND	ND	QN	QN	QN
TO-14 VOCs (extended list)								
Propene	6.54E-02	6.54E-02	1.72E-03	6.90E-08	1.79E-05	3.128E-05	3.313E-10	7.821E-06
Dichlorodiflouromethane	4.45E-03	3.46E-03	3.96E-03	3.83E-10	9.92E-08	1.736E-07	1.838E-12	4.339E-08
Chlorodifluoromethane	3.54E-03	3.54E-03	3.54E-03	ND	ND	QN	QN	QN
Freon 114	6.99E-03	6.99E-03	6.99E-03	ND	ND	QN	Q	QN
Chloromethane	1.24E-03	1.45E-03	1.45E-03	3.08E-11	7.98E-09	1.397E-08	1.480E-13	3.493E-09
Vinyl Chloride	2.56E-03	2.56E-03	2.56E-03	Q	ND	QN	Q	QN
1,3-Butadiene	1.11E-02	1.11E-02	2.21E-03	1.20E-08	3.10E-06	5.421E-06	5.740E-11	1.355E-06
Bromomethane	3.88E-03	3.88E-03	3.88E-03	ΩN	ND	QN	Q	ND
Chloroethane	2.64E-03	2.64E-03	2.64E-03	QN	ND	QN	QN	Q.
Dichlorofluoromethane	4.21E-03	4.21E-03	4.21E-03	2	ND	QN	QN	ND

Table B-3: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 300 meter location

	Trial #1B	Trial #2B	Daily	Average	Average	Total Mass	Substance	Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Concentration	Emission
	Actual		Background	Emission	Emission	Emitted		Rate
Compound	Concentration	ŏ	Concentration	Factor (EF)	Factor	(grams/item)	(grams/m²)	(d/ltem)/sec
	(mg/m³)	(mg/m ₃)	(ˈmg/mˈ²)	(lb./item)	(Ib./Ib. NEW)		CONC	ER,
Trichloroflouromethane	1.69E-03	1.69E-03	1.69E-03	1.65E-10	4.27E-08	7.480E-08	7.922E-13	1.870E-08
Pentane	2.36E-03	2.36E-03	2.95E-03	QN	QN	QN	Ð	QN
Acrolein	5.27E-02	2.29E-02	2.29E-03	4.07E-08	1.06E-05	1.848E-05	1.957E-10	4.620E-06
1,1-Dichlorethene	4.05E-03	4.05E-03	4.05E-03	Q	Q.	QN	Q	QN
Freon 113	7.68E-03	7.68E-03	7.68E-03	Q	Q	QN	QN	2
Acetone	1.90E-02	1.66E-02	2.14E-02	N ON	QN	ON	QN.	Q
Methyl lodide	5.81E-03	5.81E-03	5.81E-03	QN	QN	QN	Q.	QN
Carbon Disulfide	3.11E-03	3.11E-03	3.11E-03	QN	QN	QN	Q.	QN
Acetonitrile	1.36E-01	1.34E-01	1.68E-03	1.46E-07	3.78E-05	6.623E-05	7.014E-10	1.656E-05
3-Chloropropene	3.13E-03	3.13E-03	3.13E-03	QN	QN	QN	Q	QN
Methylene Chloride	3.23E-01	2.33E-01	2.43E-01	6.09E-08	1.58E-05	2.763E-05	2.926E-10	6.908E-06
tert-Butyl Alcohol	3.03E-03	3.03E-03	3.03E-03	QN	Q.	QN	QN	QN
Acrylonitrile	4.34E-02	4.56E-02	2.17E-03	4.81E-08	1.25E-05	2.181E-05	2.309E-10	5.451E-06
trans-1,2-Dichloroethene	3.96E-03	3.96E-03	3.96E-03	QV	QN	QN	QN	QN
Methyl t-Butyl Ether	2.16E-03	2.16E-03	3.24E-03	QN	QN	QN	QN	QN
Hexane	2.11E-03	1.76E-03	2.82E-03	Q	QN	QN	Q	P
1,1-Dichloroethane	3.97E-03	3.97E-03	3.97E-03	ND	QN	QN	QN	QN
Vinyl Acetate	3.52E-03	3.52E-03	3.52E-03	ND	QN	QN	2	Q
cis-1,2-Dichloroethene	3.96E-03	3.96E-03	3.96E-03	QN	QN	QN	2	QN
2-Butanone	2.95E-03	2.95E-03	2.06E-03	1.16E-09	3.00E-07	5.252E-07	5.562E-12	1.313E-07
Ethyl Acetate	1.80E-02	2.52E-02	3.60E-03	2.34E-08	6.06E-06	1.061E-05	1.124E-10	2.653E-06
Methyl Acrylate	3.52E-03	3.52E-03	3.52E-03	ND	QN	QN	QN	Q
Chloroform	4.88E-03	4.88E-03	4.88E-03	ND	QN	QN	QN	QN
1,1,1-Trichloroethane	5.46E-03	5.46E-03	5.46E-03	ND	QN	QN	Q	Q
Carbon Tetrachloride	6.29E-03	6.29E-03	6.29E-03	ND	QN	QN	Q.	QN
1,2-Dichlorethane	8.09E-03	8.09E-03	4.05E-03	8.75E-09	2.27E-06	3.967E-06	4.201E-11	9.917E-07
Benzene	5.11E-01	5.43E-01	1.28E-03	5.68E-07	1.47E-04	2.578E-04	2.731E-09	6.446E-05
Isooctane	4.67E-03	4.67E-03	9.34E-04	ND	ND	QN	Q.	Q
Heptane	8.20E-04	4.10E-03	8.20E-04	7.29E-11	1.89E-08	3.306E-08	3.501E-13	8.266E-09
Trichloroethane	4.88E-03	4.88E-03	4.88E-03	ND	QN	QN	QN	Q
Ethyl Acrylate	4.09E-03	4.09E-03	4.09E-03	ND	QN	QN	QN	QN
1,2-Dichloropropane	4.62E-03	4.62E-03	4.62E-03	ND	QN	QN	QN	Q
Methyl Methacrylate	4.09E-03	4.09E-03	4.09E-03	ND	QN	QN	QN	Q
Dibromomethane	7.11E-03	7.11E-03	7.11E-03	ON	QN	QN	Q	Q
1,4-Dioxane	3.60E-03	3.60E-03	3.60E-03	QN	QN	QN	QV	QN

Table B-3: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 300 meter location

	Trial #1B	Trial #2B	Daily	Average	Average	Total Mass	Cribatona	
-	Measured	Measured	Moscired	Adiliefod			Cubstailed	Substance
	Actual	Actual	Background	Emission	Emission	Emitted	Concentration	Emission Rate
Compound	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams/item)	(grams/m³)	(a/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)	(lb./lb. NEW)		CONC	ER
Bromodichloromethane	6.70E-03	6.70E-03	6.70E-03	QN	QN	QN	S	QX
cis-1,3-Dichloropropene	4.54E-03	4.54E-03	4.54E-03	Q	QN	QN	QV	Q.
4-Methyl-2-Pentanone	4.10E-03	4.10E-03	4.10E-03	QN	QN	QN	QN	Q
Toluene	2.64E-02	2.64E-02	2.64E-03	2.59E-08	6.71E-06	1.175E-05	1.245E-10	2.938E-06
Octane	4.67E-03	4.67E-03	4.67E-03	QN	Q	QN	Q	Q
trans-1,3-Dichloropropene	4.54E-03	4.54E-03	4.54E-03	QN	QN	QN.	QN	Q
Ethyl Methacrylate	4.67E-03	4.67E-03	4.67E-03	QN	QN	QN	QN	QN
1,1,2-Trichloroethane	5.46E-03	5.46E-03	5.46E-03	QN	QN	QN	QN	QV
Tertrachloroethene	6.78E-03	6.78E-03	6.78E-03	ND	QN	QN	QN	Q
2-Hexanone	4.10E-03	4.10E-03	4.10E-03	QN	ND	QN	QN	QN
Dibromochloromethane	8.52E-03	8.52E-03	8.52E-03	ND	QN	QN	QN	QN
1,2-Dibromoethane	7.68E-03	7.68E-03	7.68E-03	QN	QN	QN	QN	QN
Chlorobenzene	4.60E-03	4.60E-03	4.60E-03	QN	QN	QN	QN	QN
1,1,1,2-Tetrachloroethane	6.87E-03	6.87E-03	6.87E-03	ND	ΩN	QN	QN	Q
Ethylbenzene	4.34E-03	3.47E-03	4.34E-03	ND	ΩN	QN	QN	Q
m/p-Xylene	1.30E-02	1.30E-02	2.17E-02	ND	QN	QN	QN	QN
o-Xylene	1.30E-02	1.30E-02	2.17E-02	ND	QN	QN	QN	QN
Styrene	8.52E-03	8.52E-03	4.26E-03	9.21E-09	2.39E-06	4.175E-06	4.422E-11	1.044E-06
Bromoform	1.03E-02	1.03E-02	1.03E-02	ON	QN	QN	QN	QN
Cumene	4.92E-03	4.92E-03	4.92E-03	ON	ND	QN	QN	QN
1,1,2,2-Tetrachlorethane	6.87E-03	6.87E-03	6.87E-03	QN	QN .	QN	QN	QN
1,2,3-Trichloropropane	6.03E-03	6.03E-03	6.03E-03	QN	ND	QN	QN	QN
Bromobenzene	6.42E-03	6.42E-03	6.42E-03	Q	Q	QN	ON	QN
4-Ethyltoluene	2.46E-03	2.46E-03	2.95E-03	Q	Ω	QN	ND	QN
1,3,5-Trimethylbenzene	1.97E-03	1.97E-03	2.46E-03	ΩN	Q	QN	QN	QV
Alpha Methyl Styrene	4.83E-03	4.83E-03	4.83E-03	Ω	Ω	QN	ON	QN
1,2,4-I rimethylbenzene	4.92E-03	4.92E-03	9.83E-03	Ω	ΩN	ON	QN	ΩN
1,3-Dichlorobenzene	6.01E-03	6.01E-03	6.01E-03	Q	Q	QN	QN	Q
1,4-Dichlorobenzene	6.01E-03	6.01E-03	6.01E-03	Q	ND	QN	QV	QN
Benzyl Chloride	5.18E-03	5.18E-03	5.18E-03	QN	ND	QN	2	QN
1,2-Dichlorobenzene	6.01E-03	6.01E-03	6.01E-03	QN	ND	ON	Q	QN
Hexachlorethane	9.68E-03	9.68E-03	9.68E-03	Q	ND	QN	QN	QN
1,2,4-Trichlorobenzene	7.42E-03	7.42E-03	7.42E-03	QN	ND	QN	QN	QN
Hexachlorobutadiene	1.07E-02	1.07E-02	1.07E-02	ND	ND	QN	QN	QN
Hydrocarbons								

Table B-3: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 300 meter location

Compound Measured Actual Methane (mg/m³) Ethylene 9.84E+00 Ethylene 4.93E-01 Acetylene 2.48E-01 Propane 2.48E-01 Propylene 8.26E-02 Propylene 8.26E-02 Propyne 3.84E-02 Isobutane 1.08E-01 1-3-Butadiene/butane 5.47E-02 1-3-Butadiene/butane 5.51E-02 1-Butyne/trans-butene 5.51E-02 2-Butyne 5.31E-02 2-Butyne 5.31E-02 1-Pentane 7.08E-01	Measured Actual Concentration (mg/m³) 9.18E+00 4.85E-01 6.60E-02 2.50E-01	Measured Background Concentration	Adjusted Emission Factor (EF)	Adjusted Emission	of Substance Emitted	Concentration	Emission Rate
Compound e e e e e e e e e e e e e e e e e e e	28.4	Background Concentration	Emission Factor (EF)	Emission	Emilled		Rate
Compound a be ne ne le ls	(No. 14)	Concentration	Factor (EF)			おけなり きばればないなっしかとなった	
e ne	(mg/m³) 9.18E+00 4.85E-01 6.60E-02 2.50E-01 8.78E-02	/ma/m3	and the second second second	Factor	(grams/Item)	(grams/m³)	(d/item)/sec
ne e/Isobutylene adiene/butane e/Itrans-butene e/Irans-butene e/Irans-butene e/Irans-butene e/Irans-butene e/Irans-butene	9.18E+00 4.85E-01 6.60E-02 2.50E-01 8.78E-02	(UIB/III)	(Ib./item)	(lb://b:#NEW)		CONC	ER.
ne ne le le ls	6.60E-02 2.50E-01 8.78E-02	9.84E-01	9.91E-06	2.57E-03	4.494E-03	4.759E-08	1.123E-03
ne le le ls	6.60E-02 2.50E-01 8.78E-02	2.87E-02	5.59E-07	1.45E-04	2.537E-04	2.687E-09	6.343E-05
ne te ls e/Isobutylene adiene/butane ne e/Irans-butene e	2.50E-01 8.78E-02	2.56E-02	7.43E-08	1.92E-05	3.369E-05	3.568E-10	8.422E-06
sobutylene ene/butane rans-butene	8.78E-02	2.95E-02	2.85E-07	7.38E-05	1.291E-04	1.368E-09	3.228E-05
sobutylene ene/butane rans-butene	A 32E NO	4.13E-02	9.74E-08	2.52E-05	4.418E-05	4.678E-10	1.104E-05
sobutylene ene/butane rans-butene	4.355-02	4.33E-02	QN	QV	QN	QN	QN
sobutylene ene/butane rans-butene	3.84E-02	3.84E-02	QN	QN	QN	QN	QN
sobutylene ene/butane rans-butene	5.47E-02	5.47E-02	Q	QN	QN	ND.	Q
ene/butane rans-butene	1.08E-01	1.08E-01	Q	QN	QV.	QN	QN
rans-butene	1.65E-01	1.65E-01	QN	QN	ON	QN	ON
ans-butene	5.51E-02	5.51E-02	QN	QN	QV	QN	QN
	1.06E-01	1.06E-01	ON	QN	QN	QN	QN
	5.31E-02	5.31E-02	QN	ΩN	QN	QN	QN
	7.08E-02	7.08E-02	QN	QN	8	QV	QN
n-Hexane 7,75E-02	7.75E-02	7.75E-02	QN	QN	QN	QN	Q
SVOCS (8270 List)							
N-nitrosodimethylamine 1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Bis(2-chloroethyl)ether 1.78E-02	1.78E-02	1.81E-02	QN	QN	Q	QN	QN
	1.78E-02	1.81E-02	QN	ND	QN	QN	QN
	1.78E-02	1.81E-02	ON	ON	QN	QN	Q
	1.78E-02	1.81E-02	QN	QN :	S	QN	QN
	1.78E-02	1.81E-02	Q	QN	QN	QN	QN
ızene	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
	1.78E-02	1.81E-02	Q	ΩN	QV	ND	QN
propyi)ether	1.78E-02	1.81E-02	Q	QN	ON	QN	QN
	1.78E-02	1.81E-02	Q	Q	QN	ON	QN
	1.78E-02	1.81E-02	QN	ND	ON	QN	QN ON
ropylamine	1.78E-02	1.81E-02	QN	QN	QN	ND	QN
Го	1.78E-02	1.81E-02	QN	QN	QN	QN	Q
Je	1.78E-02	1.81E-02	Q	ND	QN	QN	Q
	1.78E-02	1.81E-02	Q	QN	QN	ON	ND
	1.78E-02	1.81E-02	Q	QN	QN	QN	QN
	1.78E-02	1.81E-02	QN	QN	QN	QN	NO
/methane	1.78E-02	1.81E-02	Q	Q	QN	QN	QN
2,4-dichlorophenol	1.78E-02	1.81E-02	ΩN	QN	QN	QN	QN

Table B-3: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 300 meter location

	Cla #18	Frial #2B	Daily	Average	Average	Total Mass	Cithatonac	Commence
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Concentration	Emission
:	Actual	Actual	Background	Emission	Emission	Emilited		Rate
Compound	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams/item)	(grams/m³)	(g/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³).	(lb./item)	(lb./lb. NEW)		CONC	ER,
1,2,4-trichlorobenzene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Naphthalene	1.12E-02	1.30E-02	1.81E-02	1.31E-08	3.39E-06	5.929E-06	6.279E-11	1.482E-06
4-chloroaniline	1.78E-02	1.78E-02	1.81E-02	Q	QV	QN	2	QN
Hexachlorobutadiene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN ON
4-chloro-3-methylphenol	1.78E-02	1.78E-02	1.81E-02	2	QV	QN	QN	QN
2-methylnaphthalene	1.78E-02	1.78E-02	1.81E-02	Q	QV	QN	QN	QN
Hexachlorocyclopentadiene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	Q.
2,4,6-trichlorophenol	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QV	QN.
2,4,5-trichlorophenol	1.78E-02	1.78E-02	1.81E-02	ON	ND	QN	QN	QN
2-chloronaphthalene	1.78E-02	1.78E-02	1.81E-02	ND	ND	QN	QN	QN
2-nitroaniline	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Acenaphthylene	1.78E-02	1.78E-02	1.81E-02	ON	ON	QN	QN	QN
Dimethylphthalate	1.78E-02	1.78E-02	1.81E-02	ND	QN	QN	QN	QN
2,6-dinitrotoluene	1.78E-02	1.78E-02	1.81E-02	ND	ND	QN	QN	QN
Acenaphthene	1.78E-02	1.78E-02	1.81E-02	QN	ND	QN	QN	QN
3-nitroaniline	3.55E-02	3.56E-02	3.62E-02	QN	QN	QN	QN	QN
2,4-dinitrophenol	3.55E-02	3.56E-02	3.62E-02	ND	ND	QN	Q	QN
Dibenzofuran	1.78E-02	1.78E-02	1.81E-02	Q	ND	QN	Q.	S
2,4-dinitrotoluene	1.78E-02	1.78E-02	1.81E-02	ND	ND	QN	Q	QN
4-nitrophenol	3.55E-02	3.56E-02	3.62E-02	ND	ND	QN	Q.	QN
Fluorene	1.78E-02	1.78E-02	1.81E-02	ON	ON	QN	QN	QN
4-chlorophenyl-phenylether	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Diethylphthalate	1.78E-02	1.78E-02	1.81E-02	QN	ΩN	GN	QN	QN
4-nitroaniline	3.55E-02	3.56E-02	3.62E-02	ΩN	ND	QN	Q	QN
4,6-dinitro-2-methylphenol	3.55E-02	3.56E-02	3.62E-02	Q	ND	QN	Q	Q
N-nitrosodiphenylamine(1)	1.78E-02	1.78E-02	1.81E-02	ND	ND	QN	2	QN
4-bromophenyi-phenylether	1.78E-02	1.78E-02	1.81E-02	ND	ND	QN	Q	QN
Hexachlorobenzene	1.78E-02	1.78E-02	1.81E-02	ON	ON	QN	QN	QN
Pentachlorophenol	3.55E-02	3.56E-02	3.62E-02	ND	ND	QN	QN	QN
Phenanthrene	1.78E-02	1.78E-02	1.81E-02	Ω	ND	QN	2	QN
Anthracene	1.78E-02	1.78E-02	1.81E-02	Q	ND	ON	QN	QN
Di-n-butylphthalate	1.78E-02	1.10E-02	1.81E-02	2.58E-07	6.67E-05	1.168E-04	1.237E-09	2.920E-05
Fluoranthene	1.78E-02	1.78E-02	1.81E-02	Q.	ND	QN	Q	QN
Pyrene	1.78E-02	1.78E-02	1.81E-02	Ω	QN	QN	QN	QN
Butylbenzylphthalate	1.78E-02	1.78E-02	1.81E-02	ND	QN	QN	QV	QN

	Trial #1B	I rial #2B	Daily	Average	Average	Total Mass	Substance	Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Concentration	Emission
	Actual	Actual	Background	Emission	Emission	Emitted		Rate
Compound	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams/Item)	(grams/m³)	(d/item)/sec
Same of the Same and the second of the secon	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)	(lb./lb. NEW)		CONC	ER,
Benzo(a)anthracene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Chrysene	1.78E-02	1.78E-02	1.81E-02	Q	QN	QN	QN	QN
Bis(2-ethylhexyl)phthalate	6.04E-02	5.51E-02	6.52E-02	8.43E-07	2.18E-04	3.823E-04	4.049E-09	9.558E-05
Di-n-octylphthalate	1.78E-02	1.78E-02	1.81E-02	9	QN	QN	QN	QN
Benzo(b)fluoranthene	1.78E-02	1.78E-02	1.81E-02	Ð	QN	ON .	QN.	QN.
Benzo(k)fluoranthene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	Q.	QN
Benzo(a)pyrene	1.78E-02	1.78E-02	1.81E-02	Q	QN	QN	QN	QN
ndeno(1,2,3-cd)pyrene	1.78E-02	1.78E-02	1.81E-02	Q	QN	QN	QN	Q
Dibenz(a,h)anthracene	1.78E-02	1.78E-02	1.81E-02	QN	QN	QN	QN	QN
Benzo(g,ħ,i)perylene	1.78E-02	1.78E-02	1.81E-02	Q	QN	QN	QN	QN
TO-13 PAHS								
Vaphthalene	9.07E-03	1.05E-02	2.72E-04	1.03E-08	2.67E-06	4.674E-06	4.950E-11	1.169E-06
Acenaphthylene	4.27E-04	5.34E-04	1.81E-05	5.19E-10	1.35E-07	2.355E-07	2.494E-12	5.887E-08
Acenaphthene	8.00E-05	8.72E-05	2.17E-05	6.90E-11	1.79E-08	3.129E-08	3.313E-13	7.822E-09
Fluorene	2.49E-04	2.85E-04	3.08E-05	2.58E-10	6.69E-08	1.171E-07	1.240E-12	2.927E-08
Phenanthrene	3.02E-04	3.91E-04	9.23E-05	2.84E-10	7.37E-08	1.290E-07	1.366E-12	3.224E-08
Anthracene	4.44E-05	5.51E-05	1.81E-05	5.38E-11	1.40E-08	2.442E-08	2.586E-13	6.105E-09
Fluoranthene	2.84E-04	3.74E-04	3.26E-05	3.24E-10	8.39E-08	1.469E-07	1.555E-12	3.672E-08
Pyrene	7.29E-04	9.61E-04	3.08E-05	8.83E-10	2.29E-07	4.007E-07	4.243E-12	1.002E-07
Benzo(a)anthracene	1.37E-04	1.78E-04	1.81E-05	1.70E-10	4.41E-08	7.720E-08	8.176E-13	1.930E-08
Chrysene	1.55E-04	2.13E-04	1.81E-05	1.99E-10	5:16E-08	9.031E-08	9.564E-13	2.258E-08
Benzo(b)fluoranthene	1.78E-04	2.49E-04	1.81E-05	2.31E-10	5.98E-08	1.047E-07	1.109E-12	2.618E-08
Benzo(k)fluoranthene	9.24E-05	1.41E-04	1.81E-05	1.26E-10	3.27E-08	5.718E-08	6.055E-13	1.429E-08
Benzo(e)pyrene	2.13E-04	2.85E-04	1.81E-05	2.69E-10	6.98E-08	1.221E-07	1.293E-12	3.054E-08
Benzo(a)pyrene	1.78E-04	2.49E-04	1.81E-05	2.31E-10	5.98E-08	1.047E-07	1.109E-12	2.618E-08
ndeno(1,2,3-cd)pyrene	1.53E-04	2.13E-04	1.81E-05	1.98E-10	5.14E-08	8.988E-08	9.518E-13	2.247E-08
Dibenz(a,h)anthracene	1.78E-05	2.49E-05	1.81E-05	2.71E-11	7.03E-09	1.230E-08	1.303E-13	3.076E-09
Benzo(g,h,i)perylene	6.04E-04	9.61E-04	1.81E-05	8.47E-10	2.19E-07	3.842E-07	4.068E-12	9.604E-08
Dioxins and Furans	A Company of the Comp							
2378-TCDD	3.70E-10	3.80E-10	3.51E-10	4.35E-16	1.13E-13	1.974E-13	2.090E-18	4.935E-14
2378-PECDD	6.89E-10	5.94E-10	7.22E-10	QN	ND	QN	QN	QN
123478-HXCDD	3.28E-10	2.72E-10	3.31E-10	QN	QN	QN	QV	NO NO
123678-HXCDD	3.46E-10	2.90E-10	3.39E-10	QN	QN	QN	QN	QN
123789-HXCDD	3.17E-10	2.64E-10	3.15E-10	QN	QN	QN	QN	QN
1234678-HPCDD	3.13E-09	3.64E-09	1.98E-09	1.92E-15	4.99E-13	8.730E-13	9.245E-18	2.183E-13

Table B-3: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 300 meter location

	rial #1B	I rial #2B	Daily	Average	Average	Total Mass	Substance	Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Concentration	Emission
	Actual	Actual	Background	Emission	Emission	Emitted		Rate
Compound	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams/item)	(grams/m³)	(g/item)/sec
	(mg/m³)	(mg/m³):	(mg/m³)	(lb./item)	(Ib./Ib. NEW)		CONC	ER.
ocep	2.31E-08	2.59E-08	1.48E-08	1.35E-14	3.50E-12	6.121E-12	6.483E-17	1.530E-12
2378-TCDF	5.71E-10	5.28E-10	8.60E-10	Q.	QN	QN	2	QN
12378-PECDF	6.10E-10	5.66E-10	6.63E-10	9	S	QN	QN	QN
23478-PECDF	4.55E-10	4.20E-10	5.01E-10	QN	QN	QN	Q.	QN
123478-HXCDF	5.20E-10	5.50E-10	5.40E-10	8.10E-17	2.10E-14	3.676E-14	3.893E-19	9.191E-15
123678-HXCDF	4.44E-10	3.97E-10	4.38E-10	QN	QN	QN	QN	QN
123789-HXCDF	2.22E-10	1.85E-10	2.11E-10	QN	Q	QN	QN	Q.
234678-HXCDF	3.10E-10	2.61E-10	3.10E-10	ND	QN	QN	QV	QN
1234678-HPCDF	9.10E-10	1.14E-09	7.50E-10	4.35E-16	1.13E-13	1.973E-13	2.090E-18	4.934E-14
1234789-HPCDF	4.62E-10	4.70E-10	4.33E-10	QN	QN	QN	QV	QN
OCDF	2.00E-09	1.09E-09	1.57E-09	2.23E-16	5.77E-14	1.010E-13	1.070E-18	2.525E-14
Energetics			T					
Nitrobenzene	2.00E+00	2.00E+00	AN	QN	QN	QN	QN	QN
2-Nitrotoluene	2.00E+00	2.00E+00	NA	QN	S	QN	Q	QN.
3-Nitrotoluene	2.00E+00	2.00E+00	NA	ND	QN	ON	QN	QN
4-Nitrotoluene	2.00E+00	2.00E+00	NA	ND	QN	QN	Q	Q
Nitroglycerine	2.00E+00	2.00E+00	NA	QN	QN	QN	QV	QN
1,3-Dinitrobenzene	2.00E+00	2.00E+00	NA	ND	QN	QN	Q	QN
2,6-Dinitrotoluene	2.00E+00	2.00E+00	NA	ND	QN	QN	QV	QV
2,4-Dinitrotoluene	2.00E+00	2.00E+00	Ϋ́	ND	QN	QN	QN	Q
1,3,5-Trinitrobenzene	2.00E+00	2.00E+00	NA	ND	ND	QN	Q	Q
2,4,6-Trinitrotoluene	2.00E+00	2.00E+00	NA A	ND	QN	QN	Q	Q
RDX	2.00E+00	2.00E+00	A'N	ND	QN	QN	QN	Q
4-Amino-2,6-Dinitrotoluene	2.00E+00	2.00E+00	NA	ND	ND	QN	Q	QV
2-Amino-4,6-Dinitrotoluene	2.00E+00	2.00E+00	NA	ND	QN	QN	Q	QN
Tetryl	2.00E+00	2.00E+00	NA	ND	QN	QN	Q.	Q
НМХ	4.00E+00	4.00E+00	NA	ND	QN	QN	Q.	QN
Pentaerythritoltetranitrate	4.00E+00	4.00E+00	NA	ND	ON	QN	S	Q
Dibutyl phthalate	5.00E+01	5.00E+01	NA	ND	ND	QN	Q	QN
Dioctyl phthalate	5.00E+01	5.00E+01	NA	ND	QN	QN	Q	Q
Diphenylamine	5.00E+01	5.00E+01	NA	QN	QN	QV	QV	QN
Footnotes:								

Footnotes: ¹ATC = Aberdeen Test Center (for additional information on the data, refer to the Firing Point Emission Study) NA = Not Applicable

MMR_5.56_unleaded

Table B-3: Air Modeling Output Data for the Tungsten Cartridge, 5.56-mm Ball, M855 (M16A2) - 300 meter location

	Trial #1B	Trial #2B	Daily	Average	Average	Total Mass	Substance	Substance
	Measured	Measured	Measured	Adjusted	Adjusted	of Substance	Concentration Emission	Emission
	Actual	Actual	Background	Emission	Emission	Emitted		Rate
Compound	Concentration	Concentration	Concentration	Factor (EF)	Factor	(grams/Item)	(grams/m³)	(g/item)/sec
	(mg/m³)	(mg/m³)	(mg/m³)	(lb./item)	(Ib./Ib. NEW)		CONC	ER
ND = Not Detected								

APPENDIX C

HEALTH-BASED SCREENING LEVELS AND ACUTE TOXICITY VALUES

Appendix C: Health-Based Screening Levels and Acute Toxicity Values

		Region 9	Toxicity	Region 3	Toxicity						
Compound	CAS#		Endpoint	RBC	Endpoint	HBSL	ERPG		AEGL	Source	ATV
		(µa/m³)	(c or nc)	(_E ш/grl)	(c or nc)	(_m /gr)	('m/grl)	(_E m/gd)	(µg/m³)	(A,T,or E)	(_E m/gri)
Permanent Gases											
Ammonia (NH ₃)	7664-41-7	1.04E+02	uc	1.04E+02	ည	1.04E+02	1.75E+04	1.75E+04	¥	ш	1.75E+04
Carbon Dioxide (CO ₂)	124-38-9	ΑN		Ϋ́		NA	NA	5.40E+07	AA	_	5.40E+07
Carbon Monoxide (CO)	630-08-0ª	1.00E+04	JU	¥		1.00E+04	2.30E+05	2.28E+05	ΑN	ш	2.30E+05
Oxides of Nitrogen (as NO)	10102-43-9ª	1.00E+02	nc	3.65E+02	nc	1.00E+02	NA	3.08E+04	ΑΝ	-	3.08E+04
Sulfur Dioxide (SO ₂)	7446-09-5ª	8.00E+01	р	AA		8.00E+01	7.89E+02	7.86E+02	Ā	Ш	7.89E+02
Acid Gases											
Hydrogen fluoride	7664-39-3	NA		NA		NA	1.60E+03	1.64E+03	1.60E+03	٧	1.60E+03
Hydrogen chloride	7647-01-0	2.08E+01	nc	2.08E+01	nc	2.08E+01	4.50E+03	4.47E+03	2.70E+03	٧	2.70E+03
Hydrogen bromide	10035-10-6	NA		ΝA		NA	NA	9.93E+03	NA	L	9.93E+03
Nitric Acid	7697-37-2	NA		NA		NA	NA	2.58E+03	1.30E+03	٧	1.30E+03
Phosphoric acid	7664-38-2	1.04E+01	nc	1.06E+01	nc	1.04E+01	NA	3.00E+03	NA	1	3.00E+03
Sulfuric Acid	7664-93-9	NA		NA		NA	2.00E+03	2.00E+03	NA	ш	2.00E+03
Cyanide											
Particulate Cyanide	57-12-5	NA		7.30E+01	nc	7.30E+01	NA	5.00E+03	NA	1	5.00E+03
Hydrogen Cyanide	74-90-8	3.13E+00	nc	3.14E+00	nc	3.13E+00	NA	5.17E+03	NA	1	5.17E+03
Particulates											
Total Suspended Particulate	12789-66-1	5.00E+01	nc	NA		5.00E+01	NA	NA	NA		ΑΝ
PM ₁₀	В	5.00E+01	nc	NA		5.00E+01	NA	NA	NA		NA
PM _{2.5}	в	1.50E+01	nc	NA		1.50E+01	NA	NA	NA		A A
Metals											
Aluminum	7429-90-5	5.11E+00	nc	3.65E+00	nc	3.65E+00	NA	3.00E+04	NA	Τ	3.00E+04
Antimony	7440-36-0	ΑN		1.46E+00	nc	1.46E+00	NA	1.50E+03	NA	_	1.50E+03
Arsenic	7440-38-2	4.47E-04	ပ	4.15E-04	C	4.15E-04	NA	3.00E+01	NA	1	3.00E+01
Barium	7440-39-3	5.21E-01	nc	5.11E-01	nc	5.11E-01	NA	1.50E+03	NA	Ţ	1.50E+03
Beryllium	7440-41-7	8.00E-04	၁	7.45E-04	C	7.45E-04	NA	5.00E+00	NA	⊢	5.00E+00
Cadmium	7440-43-9	1.07E-03	၁	9.94E-04	٠ د	9.94E-04	NA	3.00E+01	NA	⊢	3.00E+01
Calcium	7440-70-2	ΑA		¥	O	NA	NA	3.00E+04	NA	T	3.00E+04
Chromium	7440-47-3		υ	1.53E-04	ပ	1.53E-04	NA	1.50E+03	NA	T	1.50E+03
Cobalt	7440-48-4	NA		2.19E+02	nc	2.19E+02	NA	6.00E+01	NA	Ţ	6.00E+01
Copper	7440-50-8	NA		1.46E+02	nc	1.46E+02	NA	3.00E+03	NA	T	3.00E+03
Lead	7439-92-1 ^a	1.50E+00	nc	NA		1.50E+00	NA	1.50E+02	NA	⊢	1.50E+02

Appendix C: Health-Based Screening Levels and Acute Toxicity Values

		Region 9	Toxicity	Region 3	Toxicity						
Compound	CAS#	PRG	Endpoint	RBC	Endpoint	HBSL	ERPG	TEP	AEGL	Source	ATV
		(hg/m³)	(c or nc)	(hg/m³)	(c or nc)	(µg/m ₃)	(hg/m³)	(mg/m³)	(µg/m ₃)	(A,T,orE)	(µg/m³)
Magnesium	7439-95-4	NA		ΝA		ΑĀ	NA	3.00E+04	ΑN	-	3.00E+04
Manganese	7439-96-5	5.11E-02	nc	5.22E-02	nc	5.11E-02	NA	3.00E+03	A A	-	3.00E+03
Nickel	7440-02-0	NA		7.30E+01	2	7.30E+01	NA	3.00E+03	Y Y	-	3.00E+03
Selenium	7782-49-2	NA		1.83E+01	nc	1.83E+01	NA	6.00E+02	AA	_	6.00E+02
Silver	7440-22-4	NA		1.83E+01	20	1.83E+01	NA	3.00E+02	A A	F	3.00E+02
Thallium	7440-28-0	NA		2.56E-01	ည	2.56E-01	NA	3.00E+02	AA	-	3.00E+02
Vanadium	7440-62-2	NA		2.56E+01	nc 2	2.56E+01	NA	1.50E+02	A A	L	1.50E+02
Zinc	7440-66-6	NA		1.10E+03	nc	1.10E+03	NA	3.00E+04	NA A	-	3.00E+04
TO-11 Carbonyls											
Formaldehyde	20-00-0	1.48E-01	C	1.39E-01	ပ	1.39E-01	1.23E+03	1.23E+03	ΑA	ш	1.23E+03
Acetaldehyde	75-07-0	8.73E-01	C	8.13E-01	ပ	8.13E-01	1.80E+04	1.80E+04	AA	Ш	1.80E+04
Acetone	67-64-1	3.65E+02	nc	3.65E+02	nc	3.65E+02	NA	2.37E+06	Y A	F	2.37E+06
Acrolein	107-02-8	2.09E-02	nc	2.08E-02	nc	2.08E-02	2.30E+02	2.29E+02	AA	ш	2.30E+02
Proprionaldehyde	123-38-6	NA		NA		NA	NA	7.50E+04	AN	F	7.50E+04
Crotonaldehyde	4170-30-3	3.54E-03	C	3.30E-03	ပ	3.30E-03	5.72E+03	5.72E+03	A A	Ш	5.72E+03
Butyraldehyde	123-72-8	NA		NA		NA	NA	7.38E+04	N A A	-	7.38E+04
Benzaldehyde	100-52-7	3.65E+02	nc	3.65E+02	nc	3.65E+02	NA	1.50E+04	AA	_	1.50E+04
Isovaleraldehyde	590-86-3	Ϋ́		NA		NA	NA	ΝΑ	NA		A A
Valeraldehyde	110-62-3	NA		NA		NA	NA	A A	ΑN		AN
o,m,p-Tolualdehyde	1334-78-7	NA		NA		NA	NA	A A	AA		AN
Hexaldehyde	66-25-1	ΑN		NA		NA	NA	AN	AA		Ϋ́
2,5-Dimethylbenzaldehyde	5779-94-2	ΑΑ		NA		NA	NA	AN	ΑĀ		ΑΝ
VOCs											
Propene		ΑN		NA		NA	NA	ΑN	AA		AN
Dichlorodifluoromethane		2.09E+02	nc	1.83E+02	nc	1.83E+02	NA	1.48E+07	AN	_	1.48E+07
Chlorodifluoromethane		5.11E+04	nc	5.11E+04	nc	5.11E+04	NA	4.41E+06	AN	_	4.41E+06
Freon 114	76-14-2	NA		NA		NA	NA	2.10E+07	NA	F	2.10E+07
Chloromethane	74-87-3	1.07E+00	U	1.79E+00	O	1.07E+00	NA	2.06E+05	NA	 	2.06E+05
Vinyl Chloride	75-01-4	2.17E-01	U	2.09E-01	C	2.09E-01	NA	1.28E+04	NA	-	1.28E+04
1,3-Butadiene	106-99-0	3.74E-03	O	3.48E-03	U	3.48E-03	2.20E+04	2.21E+04	NA	ш	2.20E+04
Bromomethane	74-83-9	5.21E+00	٦C	5.11E+00	nc	5.11E+00	NA	5.82E+04	NA	⊥	5.82E+04
Chloroethane	75-00-3	2.32E+00	U	2.16E+00	O	2.16E+00	NA	2.64E+06	NA	T	2.64E+06
Dichlorofluoromethane	75-71-8	2.09E+02	22	1.83E+02	20	1.83E+02	NA NA	1.48E+07	NA	T	1.48E+07

Appendix C: Health-Based Screening Levels and Acute Toxicity Values

		Region 9	Toxicity	Region 3	Toxicity						
Compound	CAS#		Endpoint	RBC	Endpoint	HBSL	ERPG		AEGL	Source	A _T V
		(_E , m/grl)	(c or nc)	(m/brl)	(c or nc)	(m/gr))	('m/gri)	(m/grl)	(mg/m³)	(A, T, or E)	("m/gri)
Trichlorofluoromethane	75-69-4	7.30E+02	JC	7.30E+02	nc	7.30E+02	ΑĀ	2.81E+06	¥	T	2.81E+06
Pentane	109-66-0	NA		NA		NA	NA	1.80E+06	ΝA	⊢	1.80E+06
Acrolein	107-02-8	2.09E-02	nc	2.08E-02	ЭU	2.08E-02	2.30E+02	2.29E+02	ΑĀ	ш	2.30E+02
1,1-Dichloroethene	75-35-4	NA	nc	3.58E-02	ပ	3.58E-02	AN	7.92E+04	ΑĀ	-	7.92E+04
Freon 113	76-13-1	3.13E+04	nc	3.14E+04	nc	3.13E+04	NA	9.58E+06	ΑĀ	_	9.58E+06
Acetone	67-64-1	3.65E+02	nc	3.65E+02	nc	3.65E+02	NA	2.37E+06	ΑĀ	_	2.37E+06
Methyl lodide	74-88-4	NA		NA		ΝΑ	145000	1.45E+05	ΑΝ	ш	1.45E+05
Carbon Disulfide	75-15-0	7.30E+02	ПС	7.30E+02	nc	7.30E+02	NA	3.11E+04	NA	T	3.11E+04
Acetonitrile	75-05-8	6.20E+01	nc	6.21E+01	nc	6.20E+01	NA	1.01E+05	NA	T	1.01E+05
3-Chloropropene	107-05-1	1.04E+00	nc	NA		1.04E+00	9.39E+03	9.39E+03	NA	Ш	9.39E+03
Methylene Chloride	75-09-2	4.09E+00	၁	3.79E+00	၁	3.79E+00	000969	6.94E+05	ΑA	ш	6.96E+05
tert-Butyl Alcohol	75-65-0	NA		NA		NA	NA	4.55E+05	NA	T	4.55E+05
Acrylonitrile	107-13-1	2.83E-02	ပ	2.61E-02	၁	2.61E-02	21700	2.17E+04	NA	Ξ	2.17E+04
trans-1,2-Dichloroethene	156-60-5	7.30E+01	nc	7.30E+01	nc	7.30E+01	NA	4.95E+04	1.11E+06		1.11E+06
Methyl t-Butyl Ether	1634-04-4	3.13E+03	nc	3.13E+03	nc	3.13E+03	NA	4.32E+05	NA	Ţ	4.32E+05
Hexane	110-54-3	2.09E+02	nc	2.08E+02	DU	2.08E+02	NA	5.28E+05	ΑN	_	5.28E+05
1,1-Dichloroethane	75-34-3	5.21E+02	nc	5.11E+02	nc	5.11E+02	NA	1.21E+06	NA	T	1.21E+06
Vinyl Acetate	108-05-4	2.09E+02	nc	2.08E+02	nc	2.08E+02	19150	1.76E+04	NA	Е	1.92E+04
cis-1,2-Dichloroethene	156-59-2	3.65E+01	nc	3.65E+01	nc	3.65E+01	NA	7.92E+05	5.54E+05		5.54E+05
2-Butanone	78-93-3	1.04E+03	၁ပ	1.04E+03	n C	1.04E+03	NA	8.85E+05	NA	Ţ	8.85E+05
Ethyl Acetate	141-78-6	3.29E+03	nc	3.29E+03	nc	3.29E+03	NA	1.44E+06	NA	T	1.44E+06
Methyl Acrylate	96-33-3	1.10E+02	nc	1.10E+02	nc	1.10E+02	NA	NA	NA		NA
Chloroform	67-66-3	8.35E-02	ပ	7.73E-02	ပ	7.73E-02	NA	9.76E+03	ΝA	Т	9.76E+03
1,1,1-Trichloroethane	71-55-6	1.04E+03	nc	2.30E+03	nc	1.04E+03	1.94E+06	1.91E+06	1.25E+06		1.25E+06
Carbon Tetrachloride	56-23-5	1.28E-01	ပ	1.18E-01	ပ	1.18E-01	1.28E+05	1.26E+05	NA	Ε	1.28E+05
1,2-Dichloroethane	107-06-2	7.39E-02	ပ	6.88E-02	ပ	6.88E-02	NA	8.08E+03	NA	T	8.08E+03
Benzene	71-43-2	2.49E-01	ပ	2.16E-01	ပ	2.16E-01	1.56E+05	1.60E+05	NA	Ε	1.56E+05
Isooctane (2,2,4-trimethylpentane)	540-84-1	NA		NA		NA	NA	3.50E+05	NA	T	3.50E+05
Heptane	142-82-5	Ą		NA		NA	NA	1.80E+06	NA	1	1.80E+06
Trichloroethane	71-55-6	1.04E+03	nc	2.30E+03	၁	1.04E+03	1.94E+06	1.91E+06	NA	ш	1.94E+06
Ethyl Acrylate	140-88-5	1.40E-01	ပ	NA		1.40E-01	NA	6.14E+04	NA	T	6.14E+04
1,2-Dichloropropane	78-87-5	9.89E-02	ပ	9.21E-02	ပ	9.21E-02	NA	5.08E+05	NA	T	5.08E+05
Methyl Methacrylate	80-62-6	7.30E+02	nc	7.30E+02	nc	7.30E+02	NA	4.09E+05	ΑA	_	4.09E+05

Appendix C: Health-Based Screening Levels and Acute Toxicity Values

		Region 9	Toxicity	Region 3	Toylcify						
Compound	CAS#		Endpoint	RBC	Endpoint	HBSL	ERPG	TEEL	AEGL	Source	VTA
		(µg/m³)	(c or nc)	(hg/m³)	(c or nc)	(µg/m³)	(mg/m ₃)	(µg/m³)	(µg/m³)	(A,T,or E)	(µg/m ₃)
Dibromomethane	74-95-3	3.65E+01	nc	3.65E+01	рu	3.65E+01	ΑN	2.50E+05	Ą	_	2.50E+05
1,4-Dioxane	123-91-1	6.11E-01	ပ	5.69E-01	ပ	5.69E-01	NA	9.00E+04	A A	F	9.00E+04
Bromodichloromethane	75-27-4	1.08E-01	ပ	1.01E-01	ပ	1.01E-01	NA	4.00E+03	A A	-	4.00E+03
cis-1,3-Dichloropropene	10061-01-5	NA		NA		ΑN					
4-Methyl-2-Pentanone	108-10-1	8.34E+01	nc	7.30E+01	၁ပ	7.30E+01	NA	3.07E+05	AA	-	3.07E+05
Toluene	108-88-3	4.02E+02	nc	4.16E+02	nc	4.02E+02	1.88E+05	1.89E+05	AN	ш	1.88E+05
Octane	111-65-9	NA		NA		NA	NA	Ϋ́	AN		¥.
trans-1,3-Dichloropropene	10061-02-6	NA		6.26E-01	ပ	6.26E-01	NA	ΑΝ	AN		ΑΝ
Ethyl Methacrylate	97-63-2	3.29E+02	υC	3.29E+02	nc	3.29E+02	NA	ΑΝ	ΑN		ΑN
1,1,2-Trichloroethane	79-00-5	1.20E-01	O	1.12E-01	ပ	1.12E-01	ΝA	1.64E+05	ΑN	-	1.64E+05
Tetrachloroethene	127-18-4	3.31E+00	O	3.13E+00	ပ	3.13E+00	NA	6.78E+05	۸A	-	6.78E+05
2-Hexanone	591-78-6	AN A		5.11E+00	nc	5.11E+00	NA	4.09E+04	AN	_	4.09E+04
Dibromochloromethane	124-48-1	8.00E-02	U	7.45E-02	ပ	7.45E-02	ΑN	6.00E+03	ΑN	_	6.00E+03
1,2-Dibromoethane	106-93-4	8.73E-03	O	8.24E-03	υ	8.24E-03	NA	1.54E+05	ΑN	_	1.54E+05
Chlorobenzene	108-90-7	6.21E+01	ည	6.21E+01	၁ပ	6.21E+01	NA	1.38E+05	ΝA	-	1.38E+05
1,1,1,2-Tetrachloroethane	630-20-6	2.60E-01	O	2.41E-01	ပ	2.41E-01	NA	5.15E+04	ΑA	_	5.15E+04
Ethylbenzene	100-41-4	1.06E+03	၁ပ	1.06E+03	nc	1.06E+03	ΑN	5.43E+05	ΑΝ	-	5.43E+05
m&p-Xylene	108-38-3 106-42-3	7.30E+02	nc	7.30E+03	пс	7.30E+02	A A	6.51E+05	A A	-	6.51E+05
o-Xylene	95-47-6	7.30E+02	nc	7.30E+03	nc	7.30E+02	AA	6.51E+05	NA A	_	6.51E+05
Styrene	100-42-5	1.06E+03	nc	1.04E+03	nc	1.04E+03	2.13E+05	2.13E+05	Y.	Ш	2.13E+05
Bromoform	75-25-2	1.75E+00	U	1.61E+00	C	1.61E+00	NA	6.20E+03	AA A	_	6.20E+03
Cumene	98-82-8	4.02E+02	ည	4.02E+02	JC	4.02E+02	NA	2.46E+05	ΑA	-	2.46E+05
1,1,2,2-Tetrachloroethane	79-34-5	3.31E-02	O	3.13E-02	ပ	3.13E-02	NA	2.06E+04	AA	F	2.06E+04
1,2,3-Trichloropropane	96-18-4	9.61E-04		3.13E-03	O	9.61E-04	NA	6.03E+04	NA NA	F	6.03E+04
Bromobenzene	108-86-1	1.04E+01	2	NA		1.04E+01	NA	4.82E+04	NA	<u> </u>	4.82E+04
4-Ethyltoluene	622-96-8	¥ V		NA A		NA	NA	1.25E+05	NA	-	1.25E+05
1,3,5-Trimethylbenzene	108-67-8	6.21E+00	2	6.21E+00	JC	6.21E+00	NA	3.68E+05	NA	T	3.68E+05
Alpha Methyl Styrene	98-83-9	2.56E+02	nc	2.56E+02	nc	2.56E+02		NA	NA		AN
1,2,4-i rimethylbenzene	95-63-6	6.21E+00	ည	6.21E+00	ПС	6.21E+00		1.80E+05	NA	T	1.80E+05
1,3-Dichlorobenzene	541-73-1	3.29E+00	ည	3.29E+00	22	3.29E+00	NA	3.61E+04	NA	T	3.61E+04
1,4-Dichlorobenzene	106-46-7	3.06E-01	O	2.85E-01	O	2.85E-01		6.61E+05	NA	Ţ	6.61E+05
Benzyi Cnloride	100-44-/	3.96E-02	٥	3.68E-02	O	3.68E-02	5.20E+03	5.17E+03	A A	П	5.20E+03

Appendix C: Health-Based Screening Levels and Acute Toxicity Values

		Region 9	Toxicity	Region 3	Toxicity						
Compound	CAS#	PRG	Endpoint	RBC	Endpoint	HBSL	ERPG	圓	AEGL	Source	ATV
		(µg/m³)	(c or nc)	(ˈm/br/)	(c or nc)	(m/grl)	(m/bri)	(fm/grl)	(µg/m³)	(A, T, or E)	(_E m/gr)
1,2-Dichlorobenzene	95-50-1	2.09E+02	uc	3.29E+02	2	2.09E+02	ΑĀ	3.01E+05	Ą	L	3.01E+05
Hexachlorethane	67-72-1	4.80E-01	3	4.47E-01	ပ	4.47E-01	ΑĀ	2.90E+04	ΑĀ	-	2.90E+04
1,2,4-Trichlorobenzene	120-82-1	2.08E+02	nc	2.08E+02	nc D	2.08E+02	ΑN	3.71E+04	ΑĀ	_	3.71E+04
Hexachlorobutadiene	87-68-3	8.62E-02	U	8.03E-02	ပ	8.03E-02	3.21E+04		ΑĀ	ш	3.21E+04
Hydrocarbons											
Methane	74-82-8	NA		NA		NA	ΝA	3.30E+06	A A	F	3.30E+06
Ethylene	74-85-1	NA		NA		NA	Ϋ́	4.60E+05	ΑĀ	-	4.60E+05
Acetylene	74-86-2	NA		. NA		NA	NA	NA	ΑA		¥
Ethane	74-84-0	NA		NA		NA	NA	AN	Ϋ́		¥
Propylene	115-07-1	NA		NA		NA	ΑN	A'A	ΑN		¥
Propane	74-98-6	NA		NA		NA	NA	3.78E+06	ΑA	_	3.78E+06
Propyne (methyl acetylene)	74-99-7	NA		NA		NA	NA	2.79E+06	ΝA	-	2.79E+06
Isobutane	75-28-5	NA		NA		NA	NA	9.52E+05	۷	-	9.52E+05
1-Butene/Isobutylene (115-11-7)	106-98-9	NA		NA		NA	NA	6.87E+06	Ϋ́	_	6.87E+06
1,3-Butadiene/butane	106-99-0	3.74E-03	ပ	3.48E-03	၁	3.48E-03	2.20E+04		NA	ш	2.20E+04
cis-butene	25167-67-3	NA		NA		NA	NA	1.72E+04	NA	_	1.72E+04
1-Butyne/trans-Butene	25167-67-3	NA		NA		NA	NA	1.72E+04	NA	L	1.72E+04
2-Butyne (crotonylene)	503-17-3	NA		NA		NA	NA	NA	NA		Y Y
n-Pentane	109-66-0	NA		NA		NA	NA	1.80E+06	ΑN	-	1.80E+06
n-Hexane	110-54-3	2.09E+02	nc	2.08E+02	nc	2.08E+02	NA	5.28E+05	NA	_	5.28E+05
SVOCs											
n-nitrosodimethylamine	62-75-9	1.37E-04	ပ	1.23E-04	ပ	1.23E-04	NA	2.50E+03	NA	-	2.50E+03
bis(2-chloroethyl)ether	111-44-4	5.82E-03	ပ	5.69E-03	ပ	5.69E-03	NA	5.85E+04	ΝA	-	5.85E+04
phenol	108-95-2	2.19E+03	nc	2.19E+03	nc	2.19E+03	NA	3.85E+04	NA	_	3.85E+04
2-chlorophenol	95-57-8	1.83E+01	nc	1.83E+01	nc	1.83E+01	NA	5.25E+03	NA	-	5.25E+03
1,3-Dichlorobenzene	541-73-1	3.29E+00	၁	3.29E+00	nc	3.29E+00	NA	3.61E+04	NA	_	3.61E+04
1,4-dichlorobenzene	106-46-7	3.06E-01	U	2.85E-01	ပ	2.85E-01	NA	6.61E+05	NA	⊥	6.61E+05
1,2-dichlorobenzene	95-50-1	2.09E+02	nc	3.29E+02	nc	2.09E+02	NA	3.01E+05	NA	-	3.01E+05
benzyl alcohol	100-51-6	1.10E+03	၁	1.10E+03	· nc	1.10E+03	NA	5.53E+04	NA	-	5.53E+04
bis(2-chloroisopropyl)ether	108-60-1	1.92E-01	O	1.79E-01	U	1.79E-01	NA	6.99E+04	NA	_	6.99E+04
2-methylphenol	95-48-7	1.83E+02	JL	1.83E+02	ည	1.83E+02	NA	AN	NA		AA
hexachloroethane	67-72-1	4.80E-01	O	4.47E-01	O	4.47E-01	NA	2.90E+04	NA	T	2.90E+04
n-nitroso-di-n-propylamine	621-64-7	9.61E-04	O	8.94E-04	O	8.94E-04	NA A	2.00E+02	AA A	T	2.00E+02

Appendix C: Health-Based Screening Levels and Acute Toxicity Values

		Region 9	Toxicity	Region 3	Toxicity						
Compound	CAS#	PRG	Endpoint	RBC	Endpoint	HBSL	ERPG	TEEL	AEGL	Source	ATV
		(µg/m³)	(c or nc)	(µg/m³)	(c or nc)	(µg/m³)	(hg/m ₃)	(µg/m³)	(µg/m ₃)	(A,T,or E)	(µg/m³)
4-methylphenol	106-44-5	1.83E+02	nc	1.83E+01	20	1.83E+01	Α̈́	ΑN	A A		ΑN
nitrobenzene	98-95-3	2.09E+00	nc	2.19E+00	2	2.09E+00	A V	1.51E+04	¥	-	1.51E+04
isophorone	78-59-1	7.08E+00	C	6.59E+00	U	6.59E+00	AA	2.83E+04	A A	-	2.83E+04
2-nitrophenol	88-75-5	NA		NA		Ϋ́	ΑĀ	ΑN	¥		AN
2,4-dimethylphenol	105-67-9	7.30E+01	nc	7.30E+01	၁ပ	7.30E+01	ĄN	ΑN	A A		AN
bis(2-chloroethoxy)methane	111-91-1	NA		NA		NA	NA	AN	A A		NA A
2,4-dichlorophenol	120-83-2	1.10E+01	пc	1.10E+01	nc	1.10E+01	NA	3.00E+04	A A	-	3.00E+04
1,2,4-trichlorobenzene	120-82-1	2.08E+02	nc	2.08E+02	nc	2.08E+02	ΑĀ	3.71E+04	A A	-	3.71E+04
naphthalene	91-20-3	3.13E+00	nc	3.29E+00	nc	3.13E+00	NA	7.86E+04	AN	F	7.86E+04
4-chloroaniline	106-47-8	1.46E+01	nc	1.46E+01	nc	1.46E+01	ΑĀ	3.00E+04	AA	⊢	3.00E+04
hexachlorobutadiene	87-68-3	8.62E-02	O	8.03E-02	ပ	8.03E-02	3.21E+04	3.20E+04	A A	Ш	3.21E+04
4-chloro-3-methylphenol	59-50-7	Ϋ́		NA		NA	ΝΑ	2.00E+04	ΑĀ	F	2.00E+04
2-methylnaphthalene	91-57-6	Ϋ́		7.30E+01	nc	7.30E+01	ΝΑ	2.00E+04	ΑN	-	2.00E+04
hexachlorocyclopentadiene	77-47-4	7.30E-02	nc	7.30E-02	υC	7.30E-02	ΑA	2.23E+02	AN	-	2.23E+02
2,4,6-trichlorophenol	88-06-2	6.20E-01	S	6.26E-01	ပ	6.20E-01	N A	3.00E+04	NA	F	3.00E+04
2,4,5-trichlorophenol	95-95-4	3.65E+02	nc	3.65E+02	ည	3.65E+02	ĄZ	3.00E+04	AA	-	3.00E+04
2-chloronaphthalene	91-58-7	2.92E+02	nc	2.92E+02	nc	2.92E+02	ΑĀ	6.00E+02	NA	<u> -</u>	6.00E+02
2-nitroaniline	88-74-4	2.09E-01	nc	2.08E-01	၁	2.08E-01	AA	ΑN	AN		NA
Acenaphthylene	208-96-8	NA		NA		ΑN	ΑΝ	2.00E+02	NA	_	2.00E+02
dimethylphthalate	131-11-3	3.65E+04	nc	3.65E+04	nc	3.65E+04	A A	1.50E+04	AN	-	1.50E+04
2,6-dinitrotoluene	606-20-2	3.65E+00	nc	3.65E+00	nc	3.65E+00	AN	6.00E+02	NA	-	6.00E+02
acenaphthene	83-32-9	2.19E+02	nc	2.19E+02	nc	2.19E+02	AN	1.25E+03	NA	F	1.25E+03
3-nitroaniline	99-09-2	NA		NA		NA	NA	ΑN	AN		NA
2,4-dinitrophenol	51-28-5	7.30E+00	2	7.30E+00	nc	7.30E+00	NA	7.50E+03	NA	_	7.50E+03
dibenzofuran	132-64-9	1.46E+01	DC	1.46E+01	nc	1.46E+01	AN	NA	AN		AN
2,4-dinitrotoluene	121-14-2	7.30E+00	20	7.30E+00	၁	7.30E+00	NA	6.00E+02	NA	-	6.00E+02
4-nitrophenol	100-02-7	2.92E+01	ည	2.92E+01	nc	2.92E+01	AN	3.00E+04	ΝA	-	3.00E+04
Fluorene	86-73-7	1.46E+02	ည	1.46E+02	ПС	1.46E+02	AN	7.50E+04	NA	-	7.50E+04
4-chlorophenyl-phenylether	7005-72-3	Ϋ́		NA		NA	ΑN	ΑN	NA		A.
diethylphthalate	84-66-2	2.92E+03	nc	2.92E+03	nc	2.92E+03	ΝΑ	1.50E+04	NA	۲	1.50E+04
4-nitroaniline	100-01-6	¥.		NA		NA	AN	9.00E+03	NA	-	9.00E+03
4,6-dinitro-2-methylphenol	534-52-1	¥		3.65E-01	nc	3.65E-01	AN	5.00E+02	NA	1	5.00E+02
n-nitrosodiphenylamine(1)	86-30-6	1.37E+00	O	1.28E+00	٥	1.28E+00	NA	NA	NA		NA

Appendix C: Health-Based Screening Levels and Acute Toxicity Values

		Region 9	Toxicity	Region 3	Toxicity						
Compound	CAS#	PRG	Endpoint	RBC	Endpoint	HBSL	ERPG		AEGL	Source	}
		(mg/m ₃)	(c or nc)	(_E ш/Brl)	(c or nc)	(mg/m³)	(µg/m³)	(fm/gn)	(mg/m³)	(A,T,orE)	(fig/m³)
4-bromophenyl-phenylether	101-55-3	ΑĀ		Ā		ΑĀ	Ā	ΝA	Ä		Ϋ́
hexachlorobenzene	118-74-1	4.18E-03	U	3.91E-03	ပ	3.91E-03	NA	7.50E+01	NA	T	7.50E+01
pentachlorophenol	87-86-5	5.60E-02	ပ	5.22E-02	ပ	5.22E-02	NA	1.50E+03	NA	T	1.50E+03
phenanthrene	85-01-8	NA		NA		ΝΑ	NA	2.00E+03	ΑN	Τ	2.00E+03
anthracene	120-12-7	1.10E+03	nc	1.10E+03	nc	1.10E+03	NA	6.00E+03	NA	1	6.00E+03
di-n-butylphthalate	84-74-2	3.65E+02	nc	3.65E+02	nc	3.65E+02	NA	1.50E+04	NA	T	1.50E+04
fluoranthene	206-44-0	1.46E+02	nc	1.46E+02	nc	1.46E+02	NA	3.00E+01	NA	Ţ	3.00E+01
pyrene	129-00-0	1.10E+02	nc	1.10E+02	nc	1.10E+02	NA	1.50E+04	NA	Τ	1.50E+04
butylbenzylphthalate	2-89-58	7.30E+02	nc	7.30E+02	nc	7.30E+02	NA	5.00E+05	NA	⊢	5.00E+05
benzo(a)anthracene	26-55-3	2.17E-02	3	8.58E-03	ပ	8.58E-03	NA	6.00E+02	NA	T	6.00E+02
chrysene	218-01-9	2.17E+00		8.58E-01	၁	8.58E-01	NA	2.00E+02	NA		2.00E+02
bis(2-ethylhexyl)phthalate	117-81-7	4.80E-01		4.47E-01	၁	4.47E-01	NA	1.00E+04	NA	1	1.00E+04
di-n-octylphthalate	117-84-0	7.30E+01	nc	7.30E+01	nc	7.30E+01	NA	1.50E+05	NA	Τ	1.50E+05
benzo(b)fluoranthene	205-99-2	2.17E-02	ပ	8.58E-03	၁	8.58E-03	NA	NA	NA		AN
benzo(k)fluoranthene	207-08-9	2.17E-01	C	8.58E-02	ပ	8.58E-02	NA	NA	NA		NA
benzo(a)pyrene	50-32-8	2.17E-03	C	2.02E-03	ပ	2.02E-03	NA	7.50E+03	NA	T	7.50E+03
indeno(1,2,3-cd)pyrene	193-39-5	2.17E-02	С	8.58E-03	ပ	8.58E-03	NA	NA	NA		A
dibenz(a,h)anthracene	53-70-3	2.17E-03	၁	8.58E-04	၁	8.58E-04	NA	3.00E+04	NA	T	3.00E+04
benzo(g,h,i)perylene	191-24-2	NA		NA		NA	NA	3.00E+04	NA	_	3.00E+04
TO-13 (PAHS)											
naphthalene	91-20-3	3.13E+00	nc	3.29E+00	nc	3.13E+00	NA	7.86E+04	ΝA	⊥	7.86E+04
acenaphthylene	208-96-8	NA		NA		NA	NA	2.00E+02	NA	⊢	2.00E+02
Acenaphthene	83-32-9	2.19E+02	nc	2.19E+02	nc	2.19E+02	NA	1.25E+03	ΑA	_	1.25E+03
fluorene	86-73-7	1.46E+02	nc	1.46E+02	nc	1.46E+02	NA	7.50E+04	NA	-	7.50E+04
phenanthrene	85-01-8	NA		NA		NA	NA	2.00E+03	NA	Τ	2.00E+03
anthracene	120-12-7	1.10E+03	nc	1.10E+03	nc	1.10E+03	NA	6.00E+03	NA		6.00E+03
fluoranthene	206-44-0	1.46E+02	nc	1.46E+02	лc	1.46E+02	AA	3.00E+01	NA	_	3.00E+01
pyrene	129-00-0	1.10E+02	nc	1.10E+02	nc	1.10E+02	NA	1.50E+04	NA	L	1.50E+04
benzo(a)anthracene	56-55-3	2.17E-02	C	8.58E-03	ပ	8.58E-03	NA	6.00E+02	NA	T	6.00E+02
chrysene	218-01-9	2.17E+00	ပ	8.58E-01	ပ	8.58E-01	NA	2.00E+02	NA	Τ	2.00E+02
benzo(b)fluoranthene	205-99-2	2.17E-02	ပ	8.58E-03	U	8.58E-03	NA NA	NA	NA		A A
benzo(k)fluoranthene	207-08-9	2.17E-01	ပ	8.58E-02	O	8.58E-02	¥	NA	NA		¥
Benzo(e)pyrene	192-97-2	NA		NA		NA	NA	NA	NA		NA

Appendix C: Health-Based Screening Levels and Acute Toxicity Values

		Region 9	Toxicity	Region 3	Toxicity						
Compound	CAS#	PRG	Endpoint	RBC	Endpoint	HBSL	ERPG	TEEL	AEGL	Source	ATV
		(hg/m³)	(c or nc)	(hg/m³)	(c or nc)	(mg/m ₃)	(µg/m³)	(µg/m ₃)	(hg/m³)	(A,T,or E)	(µg/m ₃)
benzo(a)pyrene	50-32-8	2.17E-03	၁	2.02E-03	ပ	2.02E-03	ΝA	7.50E+03	ΑN	-	7.50E+03
indeno(1,2,3-cd)pyrene	193-39-5	2.17E-02	၁	8.58E-03	၁	8.58E-03	AN	NA	NA		NA NA
dibenz(a,h)anthracene	53-70-3	2.17E-03	၁	8.58E-04	0	8.58E-04	AN	3.00E+04	AN	_	3.00E+04
benzo(g,h,i)perylene	191-24-2	NA		NA		NA	ΑN	3.00E+04	NA	F	3.00E+04
Dioxins and Furans											
2378-Tetrachlorodibenzo-p-dioxin	1746-01-6	4.48E-08	၁	4.17E-08	ပ	4.17E-08	NA	3.50E+00	ΝΑ	-	3.50E+00
12378-Pentachlorodibenzo-p-dioxin	40321-76-4	NA		NA		NA	AN	2.50E+00	NA	-	2.50E+00
123478-Hexachlorodibenzo-p-dioxin		NA		NA		NA	AN	NA	NA		AN
123678-Hexachlorodibenzo-p-dioxin		NA		NA		NA	NA	1.50E+01	A A	-	1.50E+01
123789-Hexachlorodibenzo-p-dioxin	19408-74-3	1.48E-06	ပ	1.38E-06	ပ	1.38E-06	NA	NA	AA		NA
1234678-Heptachlorodibenzo-p-dioxin 35822-46-9	135822-46-9	Ϋ́		NA		NA	NA	NA	AA		ΑN
Octachlorodibenzo(p)dioxin	3268-87-9	Ϋ́		NA		NA	NA	1.50E+02	NA	-	1.50E+02
2378-Tetrachlorodibenzo-p-furan	51207-31-9	ΑN		NA		NA	NA	2.00E+00	NA	-	2.00E+00
12378-Pentachlorodibenzo-p-furan	57117-41-6	NA		NA		NA	NA	NA	N A		AA
23478-Pentachlorodibenzo-o-furan	57117-31-4	NA		NA		AN	NA	7.50E-02	ΑΝ	-	7.50E-02
123478-Hexachlorodibenzo-p-furan	70648-26-9	NA		NA		NA	NA	7.50E+00	AA	-	7.50E+00
123678-Hexachlorodibenzo-p-furan	57117-44-9	ΑN		NA		NA	NA	2.50E+00	NA	-	2.50E+00
123789-Hexachlorodibenzo-p-furan	72918-21-9	NA		NA		NA	NA	NA	AN		AN
234678-Hexachlorodibenzo-p-furan		Ϋ́		NA		NA	NA	1.50E+00	AN	-	1.50E+00
1234678-Heptachlorodibenzo-p-furan		AN		NA		NA	ΑN	NA	ΝΑ		AN
1234789-Heptachlorodibenzo-p-furan		ΑN		NA		NA	ΝA	NA	NA		NA
Octachlorodibenzofuran	39001-02-0	NA		NA		NA	NA	3.00E+02	AN	<u> </u>	3.00E+02
Energetics											
Nitrobenzene	98-95-3	2.09E+00	nc	2.19E+00	nc	2.09E+00	NA	1.51E+04	ΑN	_	1.51E+04
2-Nitrotoluene	88-72-2	3.65E+01	nc	3.65E+01	nc	3.65E+01	NA	NA	AN		NA
3-Nitrotoluene	99-08-1	3.65E+01	nc	7.30E+01	nc	3.65E+01	NA	NA	AN		AN
4-Nitrotoluene	0-66-66	3.65E+01	nc	3.65E+01	nc	3.65E+01	NA	3.37E+04	ΝΑ	-	3.37E+04
Nitroglycerine	55-63-0	4.80E-01	ပ	4.47E-01	C	4.47E-01	NA	NA	A A		AA
1,3-Dinitrobenzene	99-62-0	3.65E-01	nc	3.65E-01	nc	3.65E-01	ΑN	3.00E+03	ΑN	۲	3.00E+03
2,6-Dinitrotoluene	606-20-2	3.65E+00	nc	3.65E+00	nc	3.65E+00	NA	6.00E+02	AN	<u></u>	6.00E+02
2,4-Dinitrotoluene	121-14-2	7.30E+00		7.30E+00	nc	7.30E+00	NA	6.00E+02	AN	-	6.00E+02
1,3,5-Trinitrobenzene	99-35-4	1.10E+02	nc	1.10E+02	nc	1.10E+02	NA	3.00E+04	NA	-	3.00E+04
2,4,6-Trinitrotoluene	118-96-7	2.24E-01	O	2.09E-01	၁	2.09E-01	NA	2.50E+04	NA	F	2.50E+04

Appendix C: Health-Based Screening Levels and Acute Toxicity Values

		Region 9	Region 9 Toxicity	Region 3 Toxicity	Toxicity						
Compound	CAS#	PRG	Endpoint	RBC	Endpoint	HBSL	ERPG		AEGL	Source	ATV
		(µg/m³)	(c or nc)	(mg/m³)	(c or nc)	(m/grl)	(mg/m³)	(mg/m _s)	(m/grl)	(A,T,or E)	(µg/m³)
RDX	121-82-4	6.11E-02	ပ	5.69E-02	ပ	5.69E-02	ΑĀ	¥	¥		Ā
4-Amino-2,6-Dinitrotoluene	19406-51-0	AN		AN		Ϋ́	¥	Ą	AM		¥
2-Amino-2,6-Dinitrotoluene	35572-78-2	AN		ΑN		ΑN	AN	1.50E+04	¥.	F	1.50E+04
Tetryl	479-45-8	479-45-8 3.65E+01	၁ပ	3.65E+01	ည	3.65E+01	ΑN	ΑΝ	¥.		¥
HMX	2691-41-0	1.83E+02	nc	1.83E+02	n C	1.83E+02	ΝA	Ą	AA		¥
Pentaerythritoltetranitrate	78-11-5	NA		NA		NA	ΝΑ	5.00E+01	ΑĀ	⊢	5.00E+01
Dibutyl Phthalate	84-74-2	3.65E+02	nc	3.65E+02	ည	3.65E+02	NA	1.50E+04	¥	F	1.50E+04
Dioctyl Phthalate	117-81-7	4.80E-01	C	4.47E-01	ပ	4.47E-01	ΑĀ	1.00E+04	ΑN	F	1.00E+04
Diphenylamine	122-39-4	9.13E+01	nc	9.13E+01	2L	9.13E+01	Ą	3.00E+04	Ą	F	3.00E+04
Footnotes:											
^a = National Ambient Air Quality Standard (NAAQS) value	ndard (NAAOS)	value used	_								

^a = National Ambient Air Quality Standard (NAAQS) value used

PRG = Preliminary Remediation Goals

c = cancer

nc = non-cancer

RBC = Risk-Based Concentration

HBSL = Health-Based Screening Level

(E) ERPG = Emergency Response Planning Guidelines

(T) TEEL = Temporary Emergency Exposure Limits

(A) AEGL = Acute Exposure Guideline Level

ATV = Acute Toxicity Value

NA = Not Available

APPENDIX D RISK EVALUATION DATA

Table D-1: Comparison of Modeled Air Concentrations with Health-Based Values - 100-meter location

		Cartridge	, 5.56-mm	Tur	igsten Ba	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2)	2)	
					DODIC: A059			
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	G _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	C _{acute} / ATV	> 12
Permanent Gases								
Ammonia (NH3)	1.04E+01	1.04E+02	9.99E-02	on O	6.33E+01	1.75E+04	3.62E-03	no
Carbon Dioxide (CO2)	4.07E+02	N		na	9.90E+03	5.40E+07	1.83E-04	ou
Carbon Monoxide (CO)	7.61E+02	1.00E+04	7.61E-02	2	4.63E+03	2.30E+05	2.01E-02	ou
Oxides of Nitrogen (as NO)	4.63E+00	1.00E+02	4.63E-02	2	1.13E+02	3.08E+04	3.66E-03	no
Sulfur Dioxide (SO2)	Ϋ́Z	8.00E+01		na	NA	7.89E+02		na
Acid Gases								
Hydrogen fluoride	ΑN	N		na	NA	1.60E+03		na
Hydrogen chloride	Ϋ́	2.08E+01		na	AN	2.70E+03		na
Hydrogen bromide	ΑΝ	NΛ		na	NA	9.93E+03		na
Nitric Acid	ĄZ	NV		na	NA	1.30E+03		na
Phosphoric acid	Ϋ́Z	1.04E+01		na	NA	3.00E+03		na
Sulfuric Acid	Ϋ́	N		na	NA	2.00E+03		na
Cyanide								
Particulate Cyanide	6.25E-03	7.30E+01	8.56E-05	ou	1.52E-01	5.00E+03	3.04E-05	no
Hydrogen Cyanide	9.39E+00	3.13E+00	3.00E+00	yes	2.28E+02	5.17E+03	4.42E-02	no
Particulates								
Total Suspended Particulate	1.85E+01	5.00E+01	3.71E-01	2	1.13E+02	NA		na
PM10	1.83E+01	5.00E+01	3.66E-01	no	1.11E+02	NA		na
PM2.5	1.37E+01	1.50E+01	9.16E-01	ou	8.35E+01	NA		na
Metals								
Aluminum	9.52E-02	3.65E+00	2.61E-02	2	2.31E+00	3.00E+04	7.72E-05	ᅃ
Antimony	6.80E-01	1.46E+00	4.66E-01	ou	1.65E+01	1.50E+03	1.10E-02	2
Arsenic	NA	4.15E-04		na	NA	3.00E+01		na
Barium	2.35E-01	5.11E-01	4.60E-01	on	5.72E+00	1.50E+03	3.81E-03	no
Beryllium	NA	7.45E-04		na	NA	5.00E+00		na
Cadmium	NA	9.94E-04		na	NA	3.00E+01		na
Calcium	2.52E-01	NV		na	6.13E+00	3.00E+04	2.04E-04	ou
Chromium	NA	1.53E-04		na	NA	1.50E+03		na
Cobalt	NA	2.19E+02		na	NA	6.00E+01		na
Copper	6.72E+00	1.46E+02	4.60E-02	2	1.63E+02	3.00E+03	5.45E-02	2
Lead	2.91E+00	1.50E+00	1.94E+00	yes	7.08E+01	1.50E+02	4.72E-01	9

Table D-1: Comparison of Modeled Air Concentrations with Health-Based Values - 100-meter location

		Cartridge	e, 5.56-mn	Tur	n Tungsten Ba	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: Aกรจ	2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level	C _{chronic} / HBSL	> 12	C _{acute}	Acute Toxicity Value	Cacute/ ATV	> 12
		('m/g/l)			(1.3)	(hg/m³)		
Magnesium	3.88E-02	N		na	9.43E-01	3.00E+04	3.14E-05	2
Manganese	¥ V	5.11E-02		na	AN	3.00E+03		na
Nickel	Ϋ́	7.30E+01		na	AN	3.00E+03		na
Selenium	5.66E-03	1.83E+01	3.10E-04	no	1.38E-01	6.00E+02	2.29E-04	92
Silver	A'N	1.83E+01		na	Ϋ́	3.00E+02		na
Thallium	Ϋ́	2.56E-01		na	ΑΝ	3.00E+02		na
Vanadium	A A	2.56E+01		na	ΑN	1.50E+02		na
Zinc	9.20E-01	1.10E+03	8.40E-04	no	2.24E+01	3.00E+04	7.46E-04	2
TO-11 Carbonyis								
Formaldehyde	7.62E-02	1.39E-01	5.48E-01	no	1.08E+00	1.23E+03	8.80E-04	02
Acetaldehyde	4.79E-02	8.13E-01	5.89E-02	no	6.80E-01	1.80E+04	3.78E-05	02
Acetone	1.52E-01	3.65E+02	4.15E-04	2	3.69E+00	2.37E+06	1.56E-06	OL
Acrolein	A N	2.08E-02		na	ΑΝ	2.30E+02		na
Proprionaldehyde	NA V	NV		na	AN	7.50E+04		na
Crotonaldehyde	A A	3.30E-03		na	NA	5.72E+03		na
Butyraldehyde	AN A	N		na	NA	7.38E+04		na
Benzaldehyde	A A	3.65E+02		na	NA	1.50E+04		na
Isovaleraldehyde	AA	N<		na	NA	NA		na
Valeraldehyde	AN A	N<		na	NA	AN		na
o,m,p-Tolualdehyde	ΑN	N<		na	NA	NA		пa
Hexaldehyde	Ϋ́Υ	2		пa	NA	NA		na
2,5-Dimethylbenzaldehyde	Ψ.	N/		na	A A	NA		na
VOCs								
Propene	2.90E-02	N		na	1.76E-01	AN		na
Dichlorodifluoromethane	1.61E-04	1.83E+02	8.82E-07	no	3.92E-03	1.48E+07	2.64E-10	2
Chlorodifluoromethane	ΑN	5.11E+04		na	NA	4.41E+06		na
Freon 114	A A	N<		na	NA	2.10E+07		na
Chloromethane	5.55E-06	1.07E+00	5.20E-06	2	3.15E-04	2.06E+05	1.53E-09	ou
Vinyl Chloride	AA	2.09E-01		па	AN	1.28E+04		na
1,3-Butadiene	2.15E-03	3.48E-03	6.19E-01	oп	3.06E-02	2.20E+04	1.39E-06	no
Bromomethane	AN A	5.11E+00		na	NA	5.82E+04		na
Chloroethane	AN AN	2.16E+00		пa	AA	2.64E+06		па

Table D-1: Comparison of Modeled Air Concentrations with Health-Based Values - 100-meter location

		Cartridge	s, 5.56-mn	Tun JOOD	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	С _{асиtе} (µg/m³)	Acute Toxlcity Value (μg/m³)	C _{acute} / ATV	> 1?
Dichlorofluoromethane	ΑN	1.83E+02		na	ΑĀ	1.48E+07		na
Trichlorofluoromethane	6.94E-05	7.30E+02	9.50E-08	9	1.69E-03	2.81E+06	6.02E-10	on O
Pentane	ΑΝ	N/		na	NA	1.80E+06		na
Acrolein	1.71E-02	2.08E-02	8.24E-01	2	1.04E-01	2.30E+02	4.53E-04	2
1,1-Dichloroethene	ΑN	3.58E-02		na	¥	7.92E+04		na
Freon 113	ΑN	3.13E+04		na	NA	9.58E+06		na
Acetone	ΑN	3.65E+02		na	Ν	2.37E+06		na
Methyl lodide	AN	NΛ		na	NA	1.45E+05		na
Carbon Disulfide	AN	7.30E+02		na	NA	3.11E+04		na
Acetonitrile	6.14E-02	6.20E+01	9.91E-04	no	1.49E+00	1.01E+05	1.48E-05	ou
3-Chloropropene	AN	1.04E+00		na	NA	9.39E+03		na
Methylene Chloride	1.10E-02	3.79E+00	2.89E-03	20	1.56E-01	6.96E+05	2.24E-07	DU
tert-Butyl Alcohol	Ϋ́	N		па	Ϋ́	4.55E+05		па
Acrylonitrile	8.67E-03	2.61E-02	3.32E-01	пo	1.23E-01	2.17E+04	5.67E-06	on a
trans-1,2-Dichloroethene	AN	7.30E+01		na	NA	1.11E+06		na
Methyl t-Butyl Ether	AN	3.13E+03		na	NA	4.32E+05		na
Hexane	AN	2.08E+02		na	NA	5.28E+05		na
1,1-Dichloroethane	NA	5.11E+02		na	NA	1.21E+06		na
Vinyl Acetate	AN	2.08E+02		na	NA	1.92E+04		na
cis-1,2-Dichloroethene	AN	3.65E+01		na	NA	5.54E+05		na
2-Butanone	4.87E-04	1.04E+03	4.67E-07	no	1.18E-02	8.85E+05	1.34E-08	no
Ethyl Acetate	9.84E-03	3.29E+03	3.00E-06	no	2.39E-01	1.44E+06	1.66E-07	no
Methyl Acrylate	AN	1.10E+02		na	NA	NA		na
Chloroform	AN	7.73E-02		na	NA	9.76E+03		na
1,1,1-Trichloroethane	AN	1.04E+03		na	NA	1.25E+06		na
Carbon Tetrachloride	NA	1.18E-01		na	NA	1.28E+05		na
1,2-Dichloroethane	1.58E-03	6.88E-02	2.29E-02	no	8.95E-02	8.08E+03	1.11E-05	OU
Benzene	1.02E-01	2.16E-01	4.75E-01	no	1.45E+00	1.56E+05	9.32E-06	no
Isooctane (2,2,4-trimethylpentane)	AN	NV		na	NA	3.50E+05		na
Heptane	3.07E-05	N		na	7.46E-04	1.80E+06	4.13E-10	ou
Trichloroethane	A A	1.04E+03		na	AM	1.94E+06		na
Ethyl Acrylate	AN	1.40E-01		Ba	Ϋ́	6.14E+04		na

Table D-1: Comparison of Modeled Air Concentrations with Health-Based Values - 100-meter location

		Cartridge	e, 5.56-mn	Tun 1	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	Cehronic	Health-Based Screening Level	C _{chronic} /	> 1?	Cacute	Acute Toxicity Value	Cacute/ ATV	v 1?
	(ш/бд)	(hg/m³)	пвэг		(ˈng/m²)	(µg/m³)		
1,2-Dichloropropane	ΑN	9.21E-02		na	NA	5.08E+05		na
Methyl Methacrylate	NA A	7.30E+02		na	ΝA	4.09E+05		na
Dibromomethane	Ϋ́	3.65E+01		na	AA	2.50E+05		na
1,4-Dioxane	NA NA	5.69E-01		na	ΑA	9.00E+04		na
Bromodichloromethane	A A	1.01E-01		na	NA	4.00E+03		па
cis-1,3-Dichloropropene	A A	NV		na	Α×			na
4-Methyl-2-Pentanone	A A	7.30E+01		na	ΝΑ	3.07E+05		na
Toluene	1.09E-02	4.02E+02	2.71E-05	2	6.63E-02	1.88E+05	3.53E-07	2
Octane	ΑN	NV		na	AA	ΝΑ		na
trans-1,3-Dichloropropene	A'A	6.26E-01		na	AA	NA A		na
Ethyl Methacrylate	A'A	3.29E+02		na	NA	NA		na
1,1,2-Trichloroethane	NA	1.12E-01		па	AA	1.64E+05		na
Tetrachloroethene	N A	3.13E+00		na	AA	6.78E+05		na
2-Hexanone	A A	5.11E+00		na	AN	4.09E+04		na
Dibromochloromethane	A A	7.45E-02		na	NA	6.00E+03		na
1,2-Dibromoethane	Ϋ́	8.24E-03		na	NA	1.54E+05		na
Chlorobenzene	Ä	6.21E+01		na	NA	1.38E+05		na
1,1,1,2-Tetrachloroethane	A A	2.41E-01		na	NA	5.15E+04		na
Ethylbenzene	Ä	1.06E+03		na	AA	5.43E+05		na
m&p-Xylene	Ϋ́	7.30E+02		na	AN	6.51E+05		a
o-Xylene	Y Y	7.30E+02		пa	N A	6.51E+05		na
Styrene	3.87E-03	1.04E+03	3.71E-06	2	2.35E-02	2.13E+05	1.11E-07	92
Bromoform	¥ N	1.61E+00		Б	ΑN	6.20E+03		na
Cumene	Ϋ́	4.02E+02		па	NA	2.46E+05		na
1,1,2,2-Tetrachloroethane	Υ	3.13E-02		na	NA	2.06E+04		na
1,2,3-Trichloropropane	AN	9.61E-04		na	NA	6.03E+04		na
Bromobenzene	ΑN	1.04E+01		a	NA	4.82E+04		na
4-Ethyltoluene	ΨZ V	>N		na	ΑN	1.25E+05		na
1,3,5-Trimethylbenzene	₹ V	6.21E+00		na	NA	3.68E+05		na
Alpha Methyl Styrene	Y Z	2.56E+02		па	NA	NA		na
1,2,4-Trimethylbenzene	Y Z	6.21E+00		na	N A	1.80E+05		na
1,3-Dichlorobenzene	A A	3.29E+00		па	A A	3.61E+04		na

Table D-1: Comparison of Modeled Air Concentrations with Health-Based Values - 100-meter location

				DODI	DODIC: A059	DODIC: A059	(7	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	С _{асиtе} (µg/m³)	Acute Toxicity Value (μg/m³)	C _{acute} / ATV	× 1?
1,4-Dichlorobenzene	ΑĀ	2.85E-01		па	Ą	6.61E+05		na
Benzyl Chloride	AN	3.68E-02		na	ΑĀ	5.20E+03		na
1,2-Dichlorobenzene	Ϋ́	2.09E+02		na	ΑĀ	3.01E+05		na
Hexachlorethane	¥	4.47E-01		na	ΑĀ	2.90E+04		na
1,2,4-Trichlorobenzene	Ą	2.08E+02		na	ΑĀ	3.71E+04		па
Hexachlorobutadiene	AN	8.03E-02		па	Ϋ́	3.21E+04		na
Hydrocarbons								
Methane	4.17E+00	2		БП	1.01E+02	3.30E+06	3.07E-05	2
Ethylene	2.35E-01	N<		na	5.72E+00	4.60E+05	1.24E-05	2
Acetylene	3.12E-02	N/		па	1.90E-01	ΑN		na
Ethane	1.20E-01	N N		na	7.28E-01	NA		na
0	4.10E-02	N N		na	2.49E-01	A A		na
	AN	N/		na	ΑN	3.78E+06		na
Propyne (methyl acetylene)	ΑN	N		па	ΝΑ	2.79E+06		na
Isobutane	AN	NV		na	AA	9.52E+05		na
1-Butene/Isobutylene (115-11-7)	AN	NV		na	NA	6.87E+06		na
1,3-Butadiene/butane	NA	3.48E-03		na	NA	2.20E+04		na
cis-butene	NA	NV		na	NA	1.72E+04		na
1-Butyne/trans-Butene	NA	NV		na	NA	1.72E+04		na
2-Butyne (crotonylene)	AA	NV		na	NA	NA		na
n-Pentane	AN	NV		na	NA	1.80E+06		na
n-Hexane	AN	2.08E+02		na	NA	5.28E+05		na
SVOCs								
n-nitrosodimethylamine	AN	1.23E-04		na	NA	2.50E+03		na
bis(2-chloroethyl)ether	AN	5.69E-03		na	NA	5.85E+04		na
phenol	NA	2.19E+03		na	NA	3.85E+04		na
2-chlorophenol	AN	1.83E+01		na	NA	5.25E+03		na
1,3-Dichlorobenzene	NA	3.29E+00		na	NA	3.61E+04		na
1,4-dichlorobenzene	Ϋ́	2.85E-01		na	AA	6.61E+05		na
1,2-dichlorobenzene	ΑΝ	2.09E+02		na	ΑN	3.01E+05		na
benzyl alcohol	Ϋ́	1.10E+03		na	¥	5.53E+04		na
bis(2-chloroisopropyl)ether	A A	1.79E-01		na	Α	6.99E+04		na

Table D-1: Comparison of Modeled Air Concentrations with Health-Based Values - 100-meter location

		Cartridge	, 5.56-mn	n Tun DODI	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	С _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	Cacute/ ATV	> 1?
2-methylphenol	NA	1.83E+02		na	Α̈́	ΑN		na
hexachloroethane	NA	4.47E-01		па	ΑĀ	2.90E+04		na
n-nitroso-di-n-propylamine	NA	8.94E-04		na	ΑA	2.00E+02		na
4-methylphenol	NA	1.83E+01		na	ΝA	NA		na
nitrobenzene	NA	2.09E+00		na	ΝA	1.51E+04		na
isophorone	NA	6.59E+00		na	ΑA	2.83E+04		na
2-nitrophenol	N A	NV		na	NA NA	N.A.		na
2,4-dimethylphenol	N A	7.30E+01		na	NA	NA		na
bis(2-chloroethoxy)methane	NA	N		na	NA	NA		na
2,4-dichlorophenol	ΑΝ	1.10E+01		na	NA	3.00E+04		na
1,2,4-trichlorobenzene	ΑΝ	2.08E+02		na	NA	3.71E+04		na
naphthalene	5.50E-03	3.13E+00	1.76E-03	on O	1.34E-01	7.86E+04	1.70E-06	2
4-chloroaniline	Ϋ́Α	1.46E+01		na	NA A	3.00E+04		na
hexachlorobutadiene	A A	8.03E-02		na	NA	3.21E+04		na
4-chloro-3-methylphenol	A'A	N		na	NA	2.00E+04		na
2-methylnaphthalene	ΑΝ	7.30E+01		na	NA	2.00E+04		na
hexachlorocyclopentadiene	ΑN	7.30E-02		na	NA	2.23E+02		na
2,4,6-trichlorophenol	AA	6.20E-01		na	NA	3.00E+04		na
2,4,5-trichlorophenol	NA	3.65E+02		na	NA	3.00E+04		na
2-chloronaphthalene	NA	2.92E+02		na	NA	6.00E+02		na
2-nitroaniline	ΑN	2.08E-01		na	NA	NA		na
Acenaphthylene	ΑN	N N		na	AA	2.00E+02		na
dimethylphthalate	Υ _Α	3.65E+04		na	NA	1.50E+04		na
2,6-dinitrotoluene	A V	3.65E+00		na	NA	6.00E+02		na
acenaphthene	Ϋ́	2.19E+02		na	NA	1.25E+03		na
3-nitroaniline	NA A	N		na	NA	NA		na
2,4-dinitrophenol	A A	7.30E+00		na	NA	7.50E+03		пa
dibenzofuran	ΑΝ	1.46E+01		na	NA	NA		na
2,4-dinitrotoluene	A A	7.30E+00		na	NA	6.00E+02		na
4-nitrophenol	¥ Z	2.92E+01		na	NA	3.00E+04		na
Fluorene	A A	1.46E+02		na	ΑN	7.50E+04		na
4-chlorophenyl-phenylether	AN NA	>N		na	Ϋ́	NA		na

Table D-1: Comparison of Modeled Air Concentrations with Health-Based Values - 100-meter location

		Cartridge	s, 5.56-mn	Tur	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	G _{acute} / ATV	> 1?
diethylphthalate	NA	2.92E+03		na	ΑN	1.50E+04		na
4-nitroaniline	NA	NV		na	ΑN	9.00E+03		na
4,6-dinitro-2-methylphenol	NA	3.65E-01		na	ΑN	5.00E+02		na
n-nitrosodiphenylamine(1)	NA	1.28E+00		na	NA	ΑN		na
4-bromophenyl-phenylether	NA	NV		na	AN	NA		na
hexachlorobenzene	NA	3.91E-03		na	NA	7.50E+01		па
pentachlorophenol	NA	5.22E-02		na	NA	1.50E+03		na
phenanthrene	NA	NV		na	NA	2.00E+03		na
anthracene	NA	1.10E+03		na	NA	6.00E+03		na
di-n-butylphthalate	1.08E-01	3.65E+02	2.97E-04	no	2.63E+00	1.50E+04	1.76E-04	OL
fluoranthene	NA	1.46E+02		na	AN	3.00E+01		na
pyrene	NA	1.10E+02		na	AN	1.50E+04		na
butylbenzylphthalate	NA	7.30E+02		na	AN	5.00E+05		na
benzo(a)anthracene	ΑN	8.58E-03		na	ΑN	6.00E+02		na
chrysene	Ϋ́	8.58E-01		na	NA	2.00E+02		na
bis(2-ethylhexyl)phthalate	1.52E-01	4.47E-01	3.40E-01	5	8.62E+00	1.00E+04	8.62E-04	no
di-n-octylphthalate	ΑN	7.30E+01		na	NA	1.50E+05		na
benzo(b)fluoranthene	Υ V	8.58E-03		na	NA	NA		na
benzo(k)fluoranthene	Υ Υ	8.58E-02		na	NA	NA		na
benzo(a)pyrene	ΑN	2.02E-03		na	ΝΑ	7.50E+03		na
indeno(1,2,3-cd)pyrene	Υ V	8.58E-03		na	NA	NA		na
dibenz(a,h)anthracene	Ϋ́	8.58E-04		na	NA	3.00E+04		na
benzo(g,h,i)perylene	A V	NV		na	NA	3.00E+04		na
TO-13 (PAHs)								
naphthalene	4.33E-03	3.13E+00	1.39E-03	no	1.05E-01	7.86E+04	1.34E-06	00
acenaphthylene	2.18E-04	NV		na	NA	2.00E+02		na
Acenaphthene	2.90E-05	2.19E+02	1.32E-07	ou	NA	1.25E+03		na
fluorene	1.09E-04	1.46E+02	7.44E-07	5	2.64E-03	7.50E+04	3.52E-08	no
phenanthrene	1.20E-04	NV		na	2.91E-03	2.00E+03	1.45E-06	no
anthracene	2.26E-05	1.10E+03	2.07E-08	no	5.51E-04	6.00E+03	9.18E-08	no
fluoranthene	1.36E-04	1.46E+02	9.33E-07	5	3.31E-03	3.00E+01	1.10E-04	ou
pyrene	3.72E-04	1.10E+02	3.39E-06	2	9.04E-03	1.50E+04	6.02E-07	9

Table D-1: Comparison of Modeled Air Concentrations with Health-Based Values - 100-meter location

		Cartridge	, 5.56-mn	Tur	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronle} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	Cacute/ ATV	> 1?
benzo(a)anthracene	3.07E-05	8.58E-03	3.58E-03	5	1.74E-03	6.00E+02	2.90E-06	2
chrysene	3.59E-05	8.58E-01	4.19E-05	<u>و</u>	2.04E-03	2.00E+02	1.02E-05	92
benzo(b)fluoranthene	4.16E-05	8.58E-03	4.85E-03	2	5.90E-04	AN		na
benzo(k)fluoranthene	2.27E-05	8.58E-02	2.65E-04	no	3.22E-04	ΑΝ		na
Benzo(e)pyrene	1.13E-04	NV		na	6.89E-04	AN		na
benzo(a)pyrene	4.16E-05	2.02E-03	2.06E-02	no	2.36E-03	7.50E+03	3.15E-07	2
indeno(1,2,3-cd)pyrene	3.57E-05	8.58E-03	4.16E-03	no	5.07E-04	NA		na
dibenz(a,h)anthracene	4.89E-06	8.58E-04	5.70E-03	no	2.78E-04	3.00E+04	9.25E-09	on O
benzo(g,h,i)perylene	3.56E-04	NV		na	8.66E-03	3.00E+04	2.89E-07	ou
Dioxins and Furans								
2378-Tetrachlorodibenzo-p-dioxin	7.84E-11	4.17E-08	1.88E-03	ОU	4.45E-09	3.50E+00	1.27E-09	2
12378-Pentachlorodibenzo-p-dioxin	NA	NV		na	ΑN	2.50E+00		na
123478-Hexachlorodibenzo-p-dioxin	NA	NV		na	ΝΑ	NA		na
123678-Hexachlorodibenzo-p-dioxin	AA	NV		na	ΝA	1.50E+01		na
123789-Hexachlorodibenzo-p-dioxin	AA	1.38E-06		па	AN	NA		na
1234678-Heptachlorodibenzo-p-dioxin	8.10E-10	NV		na	4.92E-09	NA		na
Octachlorodibenzo(p)dioxin	5.68E-09	NV		na	1.38E-07	1.50E+02	9.20E-10	92
2378-Tetrachlorodibenzo-p-furan	AA	NΛ		na	AN	2.00E+00		na
12378-Pentachlorodibenzo-p-furan	ΑĀ	N		na	AN	NA		na
23478-Pentachlorodibenzo-o-furan	AA	N		na	AN	7.50E-02		na
123478-Hexachlorodibenzo-p-furan	3.41E-11	NV		na	8.29E-10	7.50E+00	1.11E-10	5
123678-Hexachlorodibenzo-p-furan	ΑN	N		na	NA	2.50E+00		na
123789-Hexachlorodibenzo-p-furan	ΑΝ	N<		na	NA	NA		na
234678-Hexachlorodibenzo-p-furan	AA	NV		na	AN	1.50E+00		na
1234678-Heptachlorodibenzo-p-furan	1.83E-10	NV		na	1.11E-09	AN		na
1234789-Heptachlorodibenzo-p-furan	ΝΑ	NV		na	AN	NA		na
Octachlorodibenzofuran	9.37E-11	NV		na	2.28E-09	3.00E+02	7.59E-12	2
Energetics								
Nitrobenzene	ΑN	2.09E+00		na	NA	1.51E+04		na
2-Nitrotoluene	A A	3.65E+01		na	NA	NA		na
3-Nitrotoluene	AA	3.65E+01		na	N A	NA		na
4-Nitrotoluene	AN	3.65E+01		na	NA	3.37E+04		na

Table D-1: Comparison of Modeled Air Concentrations with Health-Based Values - 100-meter location

		Cartridge	, 5.56-mr	n Tun DODI(n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} /	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (µg/m³)	Cacute/ ATV	> 1?
Nitroglycerine	AA	4.47E-01		па	ΑN	A'A		ВП
1,3-Dinitrobenzene	NA A	3.65E-01		na	NA	3.00E+03		na
2,6-Dinitrotoluene	NA	3.65E+00		na	NA	6.00E+02		na
2,4-Dinitrotoluene	ΑΝ	7.30E+00		па	AA	6.00E+02		па
1,3,5-Trinitrobenzene	Α V	1.10E+02		па	NA	3.00E+04		na
2,4,6-Trinitrotoluene	AN	2.09E-01		na	NA	2.50E+04		na
RDX	AN	5.69E-02		na	NA	AN		na
4-Amino-2,6-Dinitrotoluene	AN	N		na	NA	NA		БП
2-Amino-2,6-Dinitrotoluene	NA	N		na	NA	1.50E+04		na
Tetryl	AN A	3.65E+01		na	NA	AN		БП
HMX	ΝΑ	1.83E+02		na	NA	AN		na
Pentaerythritoltetranitrate	AN	N\		na	NA	5.00E+01		па
Dibutyl Phthalate	NA	3.65E+02		na	NA	1.50E+04		na
Dioctyl Phthalate	NA	4.47E-01		na	NA	1.00E+04		na
Diphenylamine	ΑN	9.13E+01		na	NA	3.00E+04		na
Footnotes:	not detected							

NA: Not applicable because compound was not detected.

na; Not available because health-based sceening value is not available or not applicable if compound was not detected.

NV: No value available.

Cahronic: Chronic time-averaged concentration

HBSL: Chronic health-based screening level

Cacute: acute concentration

ATV: Acute toxicity value

Table D-2: Comparison of Modeled Air Concentrations with Health-Based Values: Total Petroleum Hydrocarbons - 100-meter location

	Cartrid	lge, 5.56-mm Tung DODIC	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	M16A2)
Compound	C _{chronic} (µg/m³)	C _{chronte} (µg/m³)	C _{chronic} (µg/m³)	C _{chronic} (µg/m³)
	Aliphatic:C<=8	Aliphatic:C>8	Aromatic:C<=8	Aromatic:C>8
Benzene	NA	AN	2.39E-01	AN
Heptane	3.07E-05	AN	NA	NA
Toluene	NA	NA	1.09E-02	NA
Styrene	AN	ΑN	NA	3.87E-03
Propylene	4.10E-02	Ϋ́	NA	NA
naphthalene	AN	ΑN	NA	5.50E-03
naphthalene	AN	A'N	NA	4.33E-03
acenaphthylene	AN	AN	AN	2.18E-04
Acenaphthene	NA	AN	NA	2.90E-05
fluorene	NA	A'N	NA	1.09E-04
phenanthrene	NA	NA	NA	1.20E-04
anthracene	NA	NA	NA	2.26E-05
fluoranthene	NA	NA	NA	1.36E-04
Total (µg/m³)		0.00E+00	2.50E-01	1.43E-02
Derived Health-Based Screening Level	1.92E+04	1.04E+03	4.17E+02	2.09E+02
C _{chronic} /HBSL	2.14E-06	0.00E+00	5.99E-04	6.88E-05
>15	no	00	OL	OU
ootnotes:				
A = Not Applicable because compound was not detected				

C_{chronic} = chronic averaged air Concentration

HBSL = Health-Based Screening Level

Table D-3: Comparison of Modeled Air Concentrations with Health-Based Values - 200-meter location

			. 5.50-1	IDOC	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	(2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 12	С _{асиtе} (µg/m³)	Acute Toxicity Value (μg/m³)	C _{acute} / ATV	> 1?
Permanent Gases								
Ammonia (NH3)	3.99E+00	1.04E+02	3.83E-02	9	2.43E+01	1.75E+04	1.39E-03	ou
Carbon Dioxide (CO2)	1.56E+02	N		na	3.79E+03	5.40E+07	7.02E-05	ou
Carbon Monoxide (CO)	2.92E+02	1.00E+04	2.92E-02	2	1.77E+03	2.30E+05	7.71E-03	ou
Oxides of Nitrogen (as NO)	1.77E+00	1.00E+02	1.77E-02	ou	4.31E+01	3.08E+04	1.40E-03	ou
Sulfur Dioxide (SO2)	NA	8.00E+01		na	NA	7.89E+02		na
Acid Gases								
Hydrogen fluoride	AN	۸N		na	AN	1.60E+03		na
Hydrogen chloride	Α Α	2.08E+01		па	NA	2.70E+03		na
Hydrogen bromide	AN	NV		na	NA	9.93E+03		na
Nitric Acid	NA	NV		na	AN	1.30E+03		na
Phosphoric acid	AN	1.04E+01		na	AN	3.00E+03		na
Sulfuric Acid	AA	NV		na	NA	2.00E+03		na
Cyanide								
Particulate Cyanide	2.40E-03	7.30E+01	3.28E-05	no	5.83E-02	5.00E+03	1.17E-05	no
Hydrogen Cyanide	3.60E+00	3.13E+00	1.15E+00	yes	8.75E+01	5.17E+03	1.69E-02	no
Particulates	,							
Total Suspended Particulate	7.10E+00	5.00E+01	1.42E-01	no	4.32E+01	NA		na
PM10	7.02E+00	5.00E+01	1.40E-01	ou	4.27E+01	NA		na
PM2.5	5.26E+00	1.50E+01	3.51E-01	20	3.20E+01	NA NA		na
Metals								
Aluminum	3.65E-02	3.65E+00	9.99E-03	<u>و</u>	8.87E-01	3.00E+04	2.96E-05	2
Antimony	2.60E-01	1.46E+00	1.78E-01	no	6.33E+00	1.50E+03	4.22E-03	2
Arsenic	AN	4.15E-04		na	AN	3.00E+01		na
Barium	9.00E-02	5.11E-01	1.76E-01	ou	2.19E+00	1.50E+03	1.46E-03	no
Beryllium	Ϋ́	7.45E-04		вu	NA	5.00E+00		na
Cadmium	ΑN	9.94E-04		na	NA	3.00E+01		na
Calcium	9.65E-02	NV		na	2.35E+00	3.00E+04	7.83E-05	ou
Chromium	NA	1.53E-04		na	NA	1.50E+03		na
Cobalt	AN	2.19E+02		na	¥	6.00E+01		na
Copper	2.57E+00	1.46E+02	1.76E-02	인	6.26E+01	3.00E+03	2.09E-02	2
Lead	1.12E+00	1.50E+00	7.44E-01	2	2.71E+01	1.50E+02	1.81E-01	입

Table D-3: Comparison of Modeled Air Concentrations with Health-Based Values - 200-meter location

		Cartridge	e, 5.56-mr	n Tur DODI	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	С _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	× 1?	C _{acute} (µg/m³)	Acute Toxicity Value (µg/m³)	Cacute/ ATV	> 1?
Magnesium	1.49E-02	N		Па	3.61E-01	3.00E+04	1.20E-05	2
Manganese	Υ V	5.11E-02		na	ΑN	3.00E+03		na P
Nickel	ΑN	7.30E+01		na	AN	3.00E+03		e e
Selenium	2.17E-03	1.83E+01	1.19E-04	ဥ	5.27E-02	6.00E+02	8.79E-05	2
Silver	A'N	1.83E+01		na	ΑN	3.00E+02		2 2
Thallium	A'N	2.56E-01		na	AA	3.00E+02		2 2
Vanadium	ΝΑ	2.56E+01		na	AN	1.50E+02		2 0
Zinc	3.53E-01	1.10E+03	3.22E-04	no	8.58E+00	3.00E+04	2.86E-04	92
TO-11 Carbonyls								
Formaldehyde	2.92E-02	1.39E-01	2.10E-01	2	4.15E-01	1.23E+03	3.37E-04	20
Acetaldehyde	1.84E-02	8.13E-01	2.26E-02	2	2.60E-01	1.80E+04	1.45E-05	2
Acetone	5.81E-02	3.65E+02	1.59E-04	5	1.41E+00	2.37E+06	5.96E-07	2
Acrolein	A A	2.08E-02		na	¥	2.30E+02		2 0
Proprionaldehyde	NA	N		пa	AA	7.50E+04		E
Crotonaldehyde	A A	3.30E-03		na	ΑΝ	5.72E+03		na
Butyraldehyde	Ϋ́	N<		na	Ϋ́	7.38E+04		na
Benzaldehyde	ΑN	3.65E+02		na	NA	1.50E+04		na
Isovaleraldehyde	AN A	>N		na	NA	NA		na
Valeraldehyde	Ϋ́	2		na	AN	AN		na
o,m,p-Tolualdehyde	¥Z	>2		na	NA	AN		na
Hexaldehyde	Y :	2		па	NA	NA		na
z,ɔ-Dimetnyibenzaidenyde	Z Z	2		па	ΑΝ	NA		na
Propere	1 11E_02	NIX		1	100			
Dichlorodifluoromethane	6 17E-05	1 825+02	2 200 07	2	0.70E-02	NA .		na
Chlorodifluoromethane	NA NA	1.03E+02	3.30E-U/	2	1.50E-U3	1.48E+07	1.01E-10	ou
Francia 114		0.11E+04		e l	AN :	4.41E+06		na
Chloromethana	2 12 06	1 07L	100	na	Y N	2.10E+07		na
Vinyl Chloride	2. 13E-00	1.07 = +00	1.99E-06	2	1.21E-04	2.06E+05	5.86E-10	OU
Villyl Ciliolide	YN C	Z.U9E-01		па	AA	1.28E+04		па
1,3-Butadiene	8.25E-04	3.48E-03	2.37E-01	2	1.17E-02	2.20E+04	5.32E-07	9
Bromomethane	Y S	5.11E+00		a	NA NA	5.82E+04		па
Chioroethane	NA NA	2.16E+00		ga	NA NA	2.64E+06		na

Table D-3: Comparison of Modeled Air Concentrations with Health-Based Values - 200-meter location

		Cartridge	, 5.56-mn [Tun	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronlc} / HBSL	> 12	C _{acute} (µg/m³)	Acute Toxicity Value (µg/m³)	Cacute/ ATV	> 12
Dichlorofluoromethane	Š	1.83E+02		na	AN	1.48E+07		na
Trichlorofluoromethane	2.66E-05	7.30E+02	3.64E-08	9	6.46E-04	2.81E+06	2.30E-10	ou
Pentane	Ϋ́	N		na	NA	1.80E+06		na
Acrolein	6.57E-03	2.08E-02	3.16E-01	no	3.99E-02	2.30E+02	1.74E-04	no
1,1-Dichloroethene	Ϋ́	3.58E-02		na	AN	7.92E+04		na
Freon 113	Ϋ́	3.13E+04		na	NA	9.58E+06		na
Acetone	ΑΝ	3.65E+02		na	NA	2.37E+06		na
Methyl Iodide	Ϋ́	N		na	ΑN	1.45E+05		na
Carbon Disulfide	Ϋ́	7.30E+02		na	¥	3.11E+04		na
Acetonitrile	2.35E-02	6.20E+01	3.80E-04	2	5.72E-01	1.01E+05	5.68E-06	no
3-Chloropropene	ΑN	1.04E+00		na	NA	9.39E+03		na
Methylene Chloride	4.21E-03	3.79E+00	1.11E-03	ou	5.97E-02	6.96E+05	8.58E-08	no
tert-Butyl Alcohol	Ϋ́	N N		na	NA	4.55E+05		na
Acrylonitrile	3.32E-03	2.61E-02	1.27E-01	ou	4.71E-02	2.17E+04	2.17E-06	2
trans-1,2-Dichloroethene	AN	7.30E+01		па	NA	1.11E+06		na
Methyl t-Butyl Ether	AN	3.13E+03		na	NA	4.32E+05		na
Hexane	NA	2.08E+02		na	NA	5.28E+05		na
1,1-Dichloroethane	AN	5.11E+02		na	NA	1.21E+06		na
Vinyl Acetate	NA	2.08E+02		na	NA	1.92E+04		na
cis-1,2-Dichloroethene	NA	3.65E+01		na	NA	5.54E+05		na
2-Butanone	1.87E-04	1.04E+03	1.79E-07	2	4.54E-03	8.85E+05	5.13E-09	9
Ethyl Acetate	3.77E-03	3.29E+03	1.15E-06	2	9.17E-02	1.44E+06	6.37E-08	0
Methyl Acrylate	NA	1.10E+02		пa	NA	NA		na
Chloroform	NA	7.73E-02		na	NA	9.76E+03		na
1,1,1-Trichloroethane	NA	1.04E+03		na	NA	1.25E+06		na
Carbon Tetrachloride	NA	1.18E-01		пa	NA	1.28E+05		na
1,2-Dichloroethane	6.04E-04		8.78E-03	ou	3.43E-02	8.08E+03	4.24E-06	5
Benzene	3.93E-02	2.16E-01	1.82E-01	2	5.57E-01	1.56E+05	3.57E-06	OL OL
Isooctane (2,2,4-trimethylpentane)	NA	NV		па	NA	3.50E+05		na
Heptane	1.17E-05	NV		na	2.86E-04	1.80E+06	1.58E-10	no
Trichloroethane	AA	1.04E+03		na	NA	1.94E+06		na
Ethyl Acrylate	¥	1.40E-01		na	A A	6.14E+04		na

Table D-3: Comparison of Modeled Air Concentrations with Health-Based Values - 200-meter location

		Cartridge	, 5.56-mn	Tun	gsten Ba	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2)	2)	
			_	JODI	DODIC: A059			
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	Gacute/ ATV	> 1?
1,2-Dichloropropane	NA	9.21E-02		na	NA	5.08E+05		na
Methyl Methacrylate	NA	7.30E+02		na	NA	4.09E+05		na
Dibromomethane	AN	3.65E+01		na	NA	2.50E+05		na
1,4-Dioxane	NA	5.69E-01		na	NA	9.00E+04		na
Bromodichloromethane	NA	1.01E-01		na	NA	4.00E+03		a
cis-1,3-Dichloropropene	NA	NV		na	NA			na
4-Methyl-2-Pentanone	NA	7.30E+01		na	NA	3.07E+05		na
Toluene	4.18E-03	4.02E+02	1.04E-05	no	2.54E-02	1.88E+05	1.35E-07	OL.
Octane	NA	NV		na	NA	NA		na
trans-1,3-Dichloropropene	NA	6.26E-01		na	NA	AN		na
Ethyl Methacrylate	NA	3.29E+02		na	NA	NA		na
1,1,2-Trichloroethane	NA	1.12E-01		na	NA	1.64E+05		na
Tetrachloroethene	NA	3.13E+00		na	NA	6.78E+05		na
2-Hexanone	ΑN	5.11E+00		na	NA	4.09E+04		na
Dibromochloromethane	NA	7.45E-02		na	NA	6.00E+03		na
1,2-Dibromoethane	ΝΑ	8.24E-03		na	NA	1.54E+05		na
Chlorobenzene	AN	6.21E+01		na	NA	1.38E+05		na
1,1,1,2-Tetrachloroethane	NA	2.41E-01		na	NA	5.15E+04		na
Ethylbenzene	NA	1.06E+03		na	NA	5.43E+05		na
m&p-Xylene	A'A	7.30E+02		na	NA	6.51E+05		na
o-Xylene	NA NA	7.30E+02		na	NA	6.51E+05		na
Styrene	1.48E-03	1.04E+03	1.42E-06	no	9.02E-03	2.13E+05	4.24E-08	no
Bromoform	ΑN	1.61E+00		na	NA	6.20E+03		na
Cumene	NA	4.02E+02		na	NA	2.46E+05		na
1,1,2,2-Tetrachloroethane	NA	3.13E-02		na	NA	2.06E+04		па
1,2,3-Trichloropropane	NA	9.61E-04		na	NA	6.03E+04		na
Bromobenzene	ΑN	1.04E+01		na	NA	4.82E+04		na
4-Ethyltoluene	A A	N		na	Ϋ́	1.25E+05		na
1,3,5-Trimethylbenzene	ΝΑ	6.21E+00		na	NA	3.68E+05		na
Alpha Methyl Styrene	ΑN	2.56E+02		na	A A	NA		na
1,2,4-Trimethylbenzene	ΑN	6.21E+00		na	NA NA	1.80E+05		na
1,3-Dichlorobenzene	NA	3.29E+00		na	A A	3.61E+04		na

Table D-3: Comparison of Modeled Air Concentrations with Health-Based Values - 200-meter location

		Cartridge	, 5.56-mn	Tun DODI	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	С _{асиtе} (µg/m³)	Acute Toxicity Value (μg/m³)	G _{acute} / ATV	> 1?
1,4-Dichlorobenzene	Ϋ́	2.85E-01		na	ΑĀ	6.61E+05		na
Benzyl Chloride	¥	3.68E-02		na	NA	5.20E+03		na
1,2-Dichlorobenzene	Ϋ́	2.09E+02		na	AA	3.01E+05		na
Hexachlorethane	¥	4.47E-01		na	NA	2.90E+04		na
1,2,4-Trichlorobenzene	ΑĀ	2.08E+02		na	NA	3.71E+04		na
Hexachlorobutadiene	ΑA	8.03E-02		na	NA	3.21E+04		na
Hydrocarbons								
Methane	1.60E+00	N		na	3.88E+01	3.30E+06	1.18E-05	no
Ethylene	9.01E-02	N N		na	2.19E+00	4.60E+05	4.77E-06	no
Acetylene	1.20E-02	ΛN		na	7.28E-02	NA		na
Ethane	4.59E-02	NV		na	2.79E-01	NA		na
Propylene	1.57E-02	N		na	9.54E-02	NA		na
Propane	Α¥	N/		na	NA	3.78E+06		na
Propyne (methyl acetylene)	ΑΝ	NN		na	NA	2.79E+06		na
Isobutane	NA	NV		na	NA	9.52E+05		na
1-Butene/Isobutylene (115-11-7)	NA	NV		na	ΑĀ	6.87E+06		na
1,3-Butadiene/butane	NA	3.48E-03		na	ΝΑ	2.20E+04		na
cis-butene	NA	NV		na	NA	1.72E+04		na
1-Butyne/trans-Butene	NA	NV		na	ΝΑ	1.72E+04		na
2-Butyne (crotonylene)	NA	NV		na	ΝA	NA		na
n-Pentane	NA	NV		na	ΑN	1.80E+06		na
n-Hexane	NA	2.08E+02		na	A W	5.28E+05		na
SVOCs								
n-nitrosodimethylamine	NA	1.23E-04		na	NA	2.50E+03		na
bis(2-chloroethyl)ether	NA	5.69E-03		na	NA	5.85E+04		na
phenol	AN	2.19E+03		na	NA	3.85E+04		na
2-chlorophenol	NA	1.83E+01		na	ΑN	5.25E+03		na
1,3-Dichlorobenzene	NA	3.29E+00		na	NA	3.61E+04		па
1,4-dichlorobenzene	ΝA	2.85E-01		na	ΑN	6.61E+05		na
1,2-dichlorobenzene	ΝA	2.09E+02		па	ΑΝ	3.01E+05		na
benzyl alcohol	NA	1.10E+03		na	NA NA	5.53E+04		na
bis(2-chloroisopropyI)ether	NA NA	1.79E-01		пa	Y V	6.99E+04		na

Table D-3: Comparison of Modeled Air Concentrations with Health-Based Values - 200-meter location

			_	OODIC	DODIC: A059	DODIC: A059	Î	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronle} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (µg/m³)	C _{acute} / ATV	v 1?
2-methylphenol	NA	1.83E+02		na	NA	NA		na
hexachloroethane	NA	4.47E-01		na	NA	2.90E+04		na
n-nitroso-di-n-propyłamine	NA	8.94E-04		na	NA	2.00E+02		na
4-methylphenol	NA	1.83E+01		na	NA	NA		na
nitrobenzene	NA	2.09E+00		na	NA	1.51E+04		na
isophorone	NA	6.59E+00		na	NA	2.83E+04		па
2-nitrophenol	ΝA	NV		na	NA	NA		na
2,4-dimethylphenol	ΝA	7.30E+01		na	NA	NA		na
bis(2-chloroethoxy)methane	NA	NV		na	NA	NA		na
2,4-dichlorophenol	NA	1.10E+01		na	NA	3.00E+04		na
1,2,4-trichlorobenzene	Ϋ́	2.08E+02		na	NA	3.71E+04		na
naphthalene	2.11E-03	3.13E+00	6.73E-04	ou	5.12E-02	7.86E+04	6.52E-07	on O
4-chloroaniline	AN	1.46E+01		na	NA	3.00E+04		na
hexachlorobutadiene	Ϋ́	8.03E-02		na	NA	3.21E+04		na
4-chloro-3-methylphenol	Ϋ́	N		па	NA	2.00E+04		na
2-methylnaphthalene	Ϋ́	7.30E+01		na	ΑN	2.00E+04		na
hexachlorocyclopentadiene	Ϋ́	7.30E-02		na	NA	2.23E+02		na
2,4,6-trichlorophenol	Ϋ́	6.20E-01		na	NA	3.00E+04		na
2,4,5-trichlorophenol	Ϋ́	3.65E+02		na	NA	3.00E+04		na
2-chloronaphthalene	Ϋ́	2.92E+02		na	NA	6.00E+02		na
2-nitroaniline	ΑΝ	2.08E-01		na	NA	NA		na
Acenaphthylene	Ϋ́	N<		па	NA	2.00E+02		na
dimethylphthalate	A A	3.65E+04		na	NA	1.50E+04		na
2,6-dinitrotoluene	Ϋ́	3.65E+00		na	NA	6.00E+02		na
acenaphthene	ΑN	2.19E+02		na	NA	1.25E+03		na
3-nitroaniline	AN	NV		na	NA	NA		na
2,4-dinitrophenol	AN	7.30E+00		na	NA	7.50E+03		na
dibenzofuran	AN	1.46E+01		na	NA	NA		na
2,4-dinitrotoluene	Ϋ́	7.30E+00		na	NA	6.00E+02		na
4-nitrophenol	Ϋ́	2.92E+01		na	NA	3.00E+04		na
Fluorene	Ϋ́	1.46E+02		na	NA	7.50E+04		na
4-chlorophenyl-phenylether	AN	>N		Б	NA	NA		na

Table D-3: Comparison of Modeled Air Concentrations with Health-Based Values - 200-meter location

		Cartridge	e, 5.56-mn	Tun L	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 12	С _{асите} (µg/m³)	Acute Toxicity Value (µg/m³)	Cacute/ ATV	> 12
diethylphthalate	ΑN	2.92E+03		na	ΑN	1.50E+04		na
4-nitroaniline	NA	N		na	A A	9.00E+03		na
4,6-dinitro-2-methylphenol	NA	3.65E-01		па	Ä	5.00E+02		na
n-nitrosodiphenylamine(1)	NA	1.28E+00		na	¥	ΝΑ		na
4-bromophenyl-phenylether	NA	NV		na	AN A	ΑN		ВП
hexachiorobenzene	NA	3.91E-03		na	Ą	7.50E+01		na
pentachlorophenol	NA	5.22E-02		na	AN	1.50E+03		na
phenanthrene	A'A	NV		na	NA	2.00E+03		na
anthracene	NA	1.10E+03		na	NA	6.00E+03		an
di-n-butylphthalate	4.15E-02	3.65E+02	1.14E-04	OU	1.01E+00	1.50E+04	6.73E-05	2
fluoranthene	A A	1.46E+02		na	NA	3.00E+01		na
pyrene	NA NA	1.10E+02		na	NA	1.50E+04		na
butylbenzylphthalate	Y Y	7.30E+02		na	NA	5.00E+05		na
benzo(a)anthracene	Š	8.58E-03		na	NA	6.00E+02		na
chrysene	Š	8.58E-01		na	NA	2.00E+02		na
bis(2-ethylhexyl)phthalate	5.82E-02	4.47E-01	1.30E-01	01	3.30E+00	1.00E+04	3.30E-04	OL
di-n-octylphthalate	¥	7.30E+01		па	NA	1.50E+05		na
benzo(b)fluoranthene	Š	8.58E-03		na	NA	NA		na
benzo(k)fluoranthene	Š	8.58E-02		na	NA	NA		na
benzo(a)pyrene	Ϋ́	2.02E-03		na	NA	7.50E+03		na
indeno(1,2,3-cd)pyrene	Ϋ́	8.58E-03		na	NA	NA		na
dibenz(a,h)anthracene	Υ Y	8.58E-04		na	NA	3.00E+04		na
benzo(g,h,i)perylene	AN	NV		na	AN	3.00E+04		na
TO-13 (PAHs)								
naphthalene	1.66E-03	3.13E+00	5.31E-04	no	4.04E-02	7.86E+04	5.14E-07	2
acenaphthylene	8.37E-05	NV		na	NA	2.00E+02		na
Acenaphthene	1.11E-05	2.19E+02	5.08E-08	no	NA	1.25E+03		an
fluorene	4.16E-05	1.46E+02	2.85E-07	2	1.01E-03	7.50E+04	1.35E-08	OU
phenanthrene	4.58E-05	N		пa	1.11E-03	2.00E+03	5.57E-07	no
anthracene	8.68E-06	1.10E+03	7.92E-09	2	2.11E-04	6.00E+03	3.52E-08	5
fluoranthene	5.22E-05	1.46E+02	3.57E-07	2	1.27E-03	3.00E+01	4.23E-05	no
pyrene	1.42E-04	1.10E+02	1.30E-06	9	3.46E-03	1.50E+04	2.31E-07	no

Table D-3: Comparison of Modeled Air Concentrations with Health-Based Values - 200-meter location

		Cartridge	, 5.56-mn	Tun	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	C _{acute} / ATV	> 1?
benzo(a)anthracene	1.18E-05	8.58E-03	1.37E-03	2	6.67E-04	6.00E+02	1.11E-06	92
chrysene	1.38E-05	8.58E-01	1.60E-05	2	7.80E-04	2.00E+02	3.90E-06	OL.
benzo(b)fluoranthene	1.59E-05	8.58E-03	1.86E-03	no	2.26E-04	N A N		na
benzo(k)fluoranthene	8.71E-06	8.58E-02	1.02E-04	2	1.24E-04	AN		na
Benzo(e)pyrene	4.34E-05	NV		na	2.64E-04	NA		na
benzo(a)pyrene	1.59E-05	2.02E-03	7.90E-03	no	9.05E-04	7.50E+03	1.21E-07	2
indeno(1,2,3-cd)pyrene	1.37E-05	8.58E-03	1.60E-03	ou	1.94E-04	A'N		na
dibenz(a,h)anthracene	1.87E-06	8.58E-04	2.18E-03	02	1.06E-04	3.00E+04	3.54E-09	2
benzo(g,h,i)perylene	1.36E-04	NV		na	3.32E-03	3.00E+04	1.11E-07	2
Dioxins and Furans								
2378-Tetrachlorodibenzo-p-dioxin	3.01E-11	4.17E-08	7.20E-04	no	1.71E-09	3.50E+00	4.87E-10	2
12378-Pentachlorodibenzo-p-dioxin	NA	۸N		na	AN	2.50E+00		na
123478-Hexachlorodibenzo-p-dioxin	NA	N N		na	AN	A A		na
123678-Hexachlorodibenzo-p-dioxin	NA	NV		na	NA	1.50E+01		na
123789-Hexachlorodibenzo-p-dioxin	NA	1.38E-06		na	AN	NA		na
1234678-Heptachlorodibenzo-p-dioxin	3.10E-10	NV		na	1.89E-09	NA		na
Octachlorodibenzo(p)dioxin	2.18E-09	NV		na	5.29E-08	1.50E+02	3.53E-10	OU
2378-Tetrachlorodibenzo-p-furan	NA	NV		na	AN	2.00E+00		na
12378-Pentachlorodibenzo-p-furan	NA	NV		na	NA	NA		na
23478-Pentachlorodibenzo-o-furan	NA	NV		na	NA	7.50E-02		na
123478-Hexachlorodibenzo-p-furan	1.31E-11	N		na	3.18E-10	7.50E+00	4.24E-11	no
123678-Hexachlorodibenzo-p-furan	ΑN	NV		na	NA	2.50E+00		na
123789-Hexachlorodibenzo-p-furan	NA	NV		na	AN	NA		na
234678-Hexachlorodibenzo-p-furan	AN	NV		na	NA	1.50E+00		па
1234678-Heptachlorodibenzo-p-furan	7.01E-11	NV		na	4.26E-10	NA		na
1234789-Heptachlorodibenzo-p-furan	AN	NΛ		na	ΑN	NA		na
Octachlorodibenzofuran	3.59E-11	NV		na	8.73E-10	3.00E+02	2.91E-12	00
Energetics								
Nitrobenzene	NA	2.09E+00		na	NA	1.51E+04		na
2-Nitrotoluene	AN	3.65E+01		na	۷V	NA		na
3-Nitrotoluene	ΝΑ	3.65E+01		na	NA	NA		na
4-Nitrotoluene	NA	3.65E+01		пa	NA NA	3.37E+04		па

Table D-3: Comparison of Modeled Air Concentrations with Health-Based Values - 200-meter location

		Cartridge	, 5.56-mn I	Tun JODI	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	(2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (µg/m³)	C _{acute} / ATV	> 1?
Nitroglycerine	NA	4.47E-01		na	NA	ĄN		na
1,3-Dinitrobenzene	NA	3.65E-01		na	ΑN	3.00E+03		na
2,6-Dinitrotoluene	AN	3.65E+00		na	AN.	6.00E+02		na
2,4-Dinitrotoluene	AN	7.30E+00		na	Ϋ́	6.00E+02		na
1,3,5-Trinitrobenzene	AN	1.10E+02		na	ΑN	3.00E+04		na
2,4,6-Trinitrotoluene	NA	2.09E-01		na	NA	2.50E+04		na
RDX	NA	5.69E-02		na	NA	AN		na
4-Amino-2,6-Dinitrotoluene	NA	NN		вu	NA	VΑ		na
2-Amino-2,6-Dinitrotoluene	NA	N/		na	¥	1.50E+04		na
Tetryl	NA	3.65E+01		na	NA	ΝΑ		na
HMX	NA	1.83E+02		na	NA	AN		na
Pentaerythritoltetranitrate	NA	N/		вu	NA	5.00E+01		na
Dibutyl Phthalate	NA	3.65E+02		ua	NA	1.50E+04		na
Dioctyl Phthalate	NA	4.47E-01		иa	NA	1.00E+04		na
Diphenylamine	ΑN	9.13E+01		ВП	AN	3.00E+04		na

Footnotes:

NA: Not applicable because compound was not detected.

na: Not available because health-based sceening value is not available or not applicable if compound was not detected.

NV: No value available.

Cchronic: Chronic time-averaged concentration

HBSL: Chronic health-based screening level

Cacute: acute concentration

ATV: Acute toxicity value

Table D-4: Comparison of Modeled Air Concentrations with Health-Based Values: Total Petroleum Hydrocarbons - 200-meter location

	Cartrid	lge, 5.56-mm Tunç DODIC	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	M16A2)
banoamo	Cchronic	Cchronic	Cchronic	Cchronic
	(hg/m³)	(hg/m³)	(hg/m³)	(hg/m³)
	Aliphatic:C<=8	Aliphatic:C>8	Aromatic:C<=8	Aromatic:C>8
Benzene	NA	NA	9.16E-02	NA
Heptane	1.17E-05	NA	ΑN	NA
Toluene	NA	NA	4.18E-03	NA
Styrene	NA	NA	AN	1.48E-03
Propylene	1.57E-02	NA	ΝΑ	NA
naphthalene	NA	AN	NA	2.11E-03
naphthalene	NA	NA	AN	1.66E-03
acenaphthylene	NA	AN	NA	8.37E-05
Acenaphthene	NA	NA	NA	1.11E-05
fluorene	NA	NA	NA	4.16E-05
phenanthrene	NA	NA	NA	4.58E-05
anthracene	NA	NA	NA	8.68E-06
fluoranthene	NA	NA	NA	5.22E-05
Total (µg/m³)	1.57E-02	0.00E+00	9.58E-02	5.49E-03
Derived Health-Based Screening Level	1.92E+04	1.04E+03	4.17E+02	2.09E+02
C _{chronic} /HBSL	8.19E-07	0.00E+00	2.30E-04	2.63E-05
>1?	no	ou	no	OU
ootnotes:				
>1? = Is the ratio greater than one?				
NA - Not Applicable because compound was not detected				
Cehronic = chronic averaged air Concentration				

HBSL = Health-Based Screening Level

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Table D-5: Comparison of Modeled Air Concentrations with Health-Based Values - 300-meter location

		Cartridge	, 5.56-mn	n Tur	igsten Ba	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2)	2)	
				DOD	DODIC: A059			
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	C _{acute} / ATV	> 1?
Permanent Gases								
Ammonia (NH3)	2.17E+00	1.04E+02	2.08E-02	uo	1.32E+01	1.75E+04	7.55E-04	2
Carbon Dioxide (CO2)	8.49E+01	N		na	2.07E+03	5.40E+07	3.82E-05	2
Carbon Monoxide (CO)	1.59E+02	1.00E+04	1.59E-02	OL.	9.66E+02	2.30E+05	4.20E-03	2
Oxides of Nitrogen (as NO)	9.65E-01	1.00E+02	9.65E-03	2	2.35E+01	3.08E+04	7.64E-04	2
Sulfur Dioxide (SO2)	¥	8.00E+01		na	ΑĀ	7.89E+02		na
Acid Gases								
Hydrogen fluoride	A A	N		na	Α̈́	1.60E+03		na
Hydrogen chloride	Ϋ́	2.08E+01		na	¥	2.70E+03		na
Hydrogen bromide	AN	N		па	AN	9.93E+03		na
Nitric Acid	AN	N		eu	AN	1.30E+03		na
Phosphoric acid	Ϋ́	1.04E+01		na	¥	3.00E+03		na
Sulfuric Acid	Ϋ́	N		na	ΑĀ	2.00E+03		na
Cyanide								
Particulate Cyanide	1.30E-03	7.30E+01	1.79E-05	on O	3.17E-02	5.00E+03	6.35E-06	on
Hydrogen Cyanide	1.96E+00	3.13E+00	6.27E-01	ou	4.77E+01	5.17E+03	9.22E-03	OU
Particulates								
Total Suspended Particulate	3.87E+00	5.00E+01	7.74E-02	ou	2.35E+01	NA		na
PM10	3.82E+00	5.00E+01	7.64E-02	ou	2.32E+01	NA		na
PM2.5	2.87E+00	1.50E+01	1.91E-01	OU	1.74E+01	NA		na
Metals								
Aluminum	1.99E-02	3.65E+00	5.44E-03	OU	4.83E-01	3.00E+04	1.61E-05	no
Antimony	1.42E-01	1.46E+00	9.72E-02	no	3.45E+00	1.50E+03	2.30E-03	uo
Arsenic	Ϋ́	4.15E-04		na	ΑN	3.00E+01		na
Barium	4.90E-02	5.11E-01	9.60E-02	no	1.19E+00	1.50E+03	7.95E-04	no
Beryllium	AN	7.45E-04		na	NA	5.00E+00		na
Cadmium	AN	9.94E-04		na	ΑN	3.00E+01		na
Calcium	5.26E-02	N		па	1.28E+00	3.00E+04	4.26E-05	no
Chromium	₹ Z	1.53E-04		na	ΝΑ	1.50E+03		na
Cobalt	₹	2.19E+02		na	NA	6.00E+01		na
Copper	1.40E+00	1.46E+02	9.61E-03	20	3.41E+01	3.00E+03	1.14E-02	no
Lead	6.08E-01	1.50E+00	4.05E-01	00	1.48E+01	1.50E+02	9.85E-02	no

Table D-5: Comparison of Modeled Air Concentrations with Health-Based Values - 300-meter location

		Cartridge	e, 5.56-mn	T E	gsten Ba	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2)	2)	
					DODIC: A059			
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	G _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	C _{acute} / ATV	> 1?
Magnesium	8.09E-03	NV		na	1.97E-01	3.00E+04	6.56E-06	on
Manganese	NA	5.11E-02		na	NA	3.00E+03		na
Nickel	NA	7.30E+01		na	NA	3.00E+03		מם
Selenium	1.18E-03	1.83E+01	6.47E-05	on	2.87E-02	6.00E+02	4.78E-05	2
Silver	NA	1.83E+01		na	ΑΝ	3.00E+02		na
Thallium	NA	2.56E-01		па	ΑN	3.00E+02		па
Vanadium	NA	2.56E+01		na	NA	1.50E+02		na
Zinc	1.92E-01	1.10E+03	1.75E-04	no	4.67E+00	3.00E+04	1.56E-04	ou
TO-11 Carbonyls								
Formaldehyde	1.59E-02	1.39E-01	1.14E-01	no	2.26E-01	1.23E+03	1.84E-04	OL
Acetaldehyde	1.00E-02	8.13E-01	1.23E-02	ОП	1.42E-01	1.80E+04	7.88E-06	ou
Acetone	3.16E-02	3.65E+02	8.67E-05	5	7.69E-01	2.37E+06	3.25E-07	00
Acrolein	NA V	2.08E-02		na	NA	2.30E+02		na
Proprionaldehyde	Ϋ́	N		na	NA	7.50E+04		na
Crotonaldehyde	Ϋ́	3.30E-03		na	NA	5.72E+03		na
Butyraldehyde	Ϋ́	N		na	NA	7.38E+04		na
Benzaldehyde	δ A	3.65E+02		na	AA	1.50E+04		na
Isovaleraldehyde	Ϋ́	N/		na	NA	NA		na
Valeraldehyde	Υ	2		na	NA	NA		na
o,m,p-Tolualdehyde	A A	N		na	NA	NA		na
Hexaldehyde	Ϋ́	N		na	NA	NA		na
2,5-Dimethylbenzaldehyde	Ϋ́	NV		na	NA	NA		na
VOCs								
Propene	6.05E-03	N		na	3.68E-02	NA		na
Dichlorodifluoromethane	3.36E-05	1.83E+02	1.84E-07	2	8.17E-04	1.48E+07	5.51E-11	ou
Chlorodifluoromethane	Υ V	5.11E+04		Па	ΑN	4.41E+06		na
Freon 114	Ϋ́	N		na	ΑN	2.10E+07		na
Chloromethane	1.16E-06	1.07E+00	1.09E-06	2	6.58E-05	2.06E+05	3.19E-10	ou
Vinyl Chloride	Ϋ́	2.09E-01		na	NA	1.28E+04		na
1,3-Butadiene	4.50E-04	3.48E-03	1.29E-01	2	6.38E-03	2.20E+04	2.90E-07	no
Bromomethane	AN	5.11E+00		na	NA	5.82E+04		na
Chloroethane	AN AN	2.16E+00		Па	N A	2.64E+06		na

Table D-5: Comparison of Modeled Air Concentrations with Health-Based Values - 300-meter location

		Cartridge	e, 5.56-mn	Tul C	n Tungsten Ba	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2)	2)	
					. 7023			
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	C _{acute} / ATV	> 12
Dichlorofluoromethane	NA	1.83E+02		na	AN	1.48E+07		na
Trichlorofluoromethane	1.45E-05	7.30E+02	1.98E-08	on O	3.52E-04	2.81E+06	1.26E-10	2
Pentane	NA	NV		na	ΑN	1.80E+06		na
Acrolein	3.58E-03	2.08E-02	1.72E-01	no	2.17E-02	2.30E+02	9.45E-05	92
1,1-Dichloroethene	NA	3.58E-02		na	NA	7.92E+04		na
Freon 113	NA	3.13E+04		na	AN	9.58E+06	,	na
Acetone	NA	3.65E+02		na	AN	2.37E+06		na
Methyl Iodide	NA	NV		na	NA	1.45E+05		na
Carbon Disulfide	NA	7.30E+02		na	AN	3.11E+04		na
Acetonitrile	1.28E-02	6.20E+01	2.07E-04	no	3.12E-01	1.01E+05	3.09E-06	92
3-Chloropropene	NA	1.04E+00		na	ΝA	9.39E+03		na
Methylene Chloride	2.29E-03	3.79E+00	6.04E-04	2	3.25E-02	6.96E+05	4.67E-08	2
tert-Butyl Alcohol	NA	NV		na	ΑN	4.55E+05		na
Acrylonitrile	1.81E-03	2.61E-02	6.93E-02	no	2.57E-02	2.17E+04	1.18E-06	2
trans-1,2-Dichloroethene	Υ Υ	7.30E+01		na	NA	1.11E+06		па
Methyl t-Butyl Ether	Ϋ́	3.13E+03		na	NA	4.32E+05		na
Hexane	Ϋ́	2.08E+02		na	NA	5.28E+05		na
1,1-Dichloroethane	Ϋ́	5.11E+02		na	NA	1.21E+06		na
Vinyl Acetate	Ϋ́	2.08E+02		na	NA	1.92E+04		na
cis-1,2-Dichloroethene	Ą	3.65E+01		na	NA	5.54E+05		na
2-Butanone	1.02E-04	1.04E+03	9.75E-08	5	2.47E-03	8.85E+05	2.79E-09	uo
Ethyl Acetate	2.05E-03	3.29E+03	6.25E-07	2	4.99E-02	1.44E+06	3.47E-08	ou
Methyl Acrylate	NA	1.10E+02		na	AN	NA		na
Chloroform	ΑΝ	7.73E-02		na	NA	9.76E+03		na
1,1,1-Trichloroethane	NA A	1.04E+03		na	NA	1.25E+06		na
Carbon Tetrachloride	AN	1.18E-01		na	NA	1.28E+05		na
1,2-Dichloroethane	3.29E-04	6.88E-02	4.78E-03	no	1.87E-02	8.08E+03	2.31E-06	2
Benzene	2.14E-02	2.16E-01	9.91E-02	50	3.03E-01	1.56E+05	1.94E-06	ou
Isooctane (2,2,4-trimethylpentane)	ΑĀ	N		na	NA	3.50E+05		na
Heptane	6.40E-06	N		na	1.56E-04	1.80E+06	8.63E-11	no
Trichloroethane	ΑN	1.04E+03		na	NA	1.94E+06		na
Ethyl Acrylate	A A	1.40E-01		na	A A	6.14E+04		na

Table D-5: Comparison of Modeled Air Concentrations with Health-Based Values - 300-meter location

		Cartridge	, 5.56-mr [Tun	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	С _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	Cacute/ ATV	> 12
1,2-Dichloropropane	NA	9.21E-02		na	ΑN	5.08E+05		na
Methyl Methacrylate	NA	7.30E+02		na	NA	4.09E+05		na
Dibromomethane	NA	3.65E+01		na	ΑN	2.50E+05		na
1,4-Dioxane	NA	5.69E-01		na	A A	9.00E+04		na
Bromodichloromethane	NA	1.01E-01		na	NA	4.00E+03		na
cis-1,3-Dichloropropene	NA	NV		na	NA			na
4-Methyl-2-Pentanone	NA	7.30E+01		na	NA	3.07E+05		na
Toluene	2.27E-03	4.02E+02	5.66E-06	no	1.38E-02	1.88E+05	7.38E-08	on
Octane	NA	NV		na	NA	NA		na
trans-1,3-Dichloropropene	A V	6.26E-01		na	NA	NA		na
Ethyl Methacrylate	NA NA	3.29E+02		na	NA	NA		па
1,1,2-Trichloroethane	ΑN	1.12E-01		na	NA	1.64E+05		na
Tetrachloroethene	NA	3.13E+00		na	NA	6.78E+05		па
2-Hexanone	A A	5.11E+00		na	NA	4.09E+04		na
Dibromochloromethane	ΑN	7.45E-02		na	NA	6.00E+03		па
1,2-Dibromoethane	AN	8.24E-03		na	NA	1.54E+05		na
Chlorobenzene	ΝΑ	6.21E+01		na	NA	1.38E+05		пa
1,1,1,2-Tetrachloroethane	NA	2.41E-01		na	NA	5.15E+04		a
Ethylbenzene	NA	1.06E+03		na	NA	5.43E+05		пa
m&p-Xylene	ΝΑ	7.30E+02		na	NA	6.51E+05		na
o-Xylene	ΑN	7.30E+02		na	NA	6.51E+05		na
Styrene	8.08E-04	1.04E+03	7.74E-07	no Ou	4.91E-03	2.13E+05	2.31E-08	on
Bromoform	NA	1.61E+00		na	NA	6.20E+03		п
Cumene	A A	4.02E+02		na	NA	2.46E+05		па
1,1,2,2-Tetrachloroethane	NA	3.13E-02		na	NA	2.06E+04		па
1,2,3-Trichloropropane	ΝΑ	9.61E-04		na	NA	6.03E+04		٦a
Bromobenzene	NA	1.04E+01		пa	NA	4.82E+04		na L
4-Ethyltoluene	ΑN	>N		na	٧	1.25E+05		na
1,3,5-Trimethylbenzene	ΑN	6.21E+00		٦a	NA	3.68E+05		na
Alpha Methyl Styrene	A A	2.56E+02		na	NA	NA		na L
1,2,4-Trimethylbenzene	NA V	6.21E+00		na	ΑA	1.80E+05		na
1,3-Dichlorobenzene	AN AN	3.29E+00		٦a	ΑΝ	3.61E+04		na

Table D-5: Comparison of Modeled Air Concentrations with Health-Based Values - 300-meter location

		Cartridge	, 5.56-mr	n Tun DODI	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	(2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	Cacute/ ATV	> 1?
1,4-Dichlorobenzene	NA	2.85E-01		na	NA	6.61E+05		na
Benzyl Chloride	NA	3.68E-02		вu	NA	5.20E+03		na
1,2-Dichlorobenzene	NA NA	2.09E+02		ua	ΑN	3.01E+05		na
Hexachlorethane	ΑN	4.47E-01		na	Ϋ́	2.90E+04		na
1,2,4-Trichlorobenzene	NA	2.08E+02		na	Ą	3.71E+04		na
Hexachlorobutadiene	ΑN	8.03E-02		na	ΑĀ	3.21E+04		na
Hydrocarbons								
Methane	8.70E-01	N		na	2.12E+01	3.30E+06	6.41E-06	92
Ethylene	4.91E-02	2		na	1.19E+00	4.60E+05	2.60E-06	92
Acetylene	6.52E-03	N		na	3.96E-02	NA		na
Ethane	2.50E-02	NV		вu	1.52E-01	NA		na
Propylene	8.55E-03	ΛN		na	5.20E-02	NA		na
Propane	NA	NV		na	NA	3.78E+06		па
Propyne (methyl acetylene)	NA	NV		na	NA	2.79E+06		na
Isobutane	A N	N		na	Ϋ́	9.52E+05		na
1-Butene/Isobutylene (115-11-7)	A N	N		na	Ϋ́	6.87E+06		na
1,3-Butadiene/butane	A N	3.48E-03		na	Ϋ́	2.20E+04		na
cis-butene	NA	NV		na	NA	1.72E+04		na
1-Butyne/trans-Butene	ΝΑ	N		na	ΑĀ	1.72E+04		na
2-Butyne (crotonylene)	Ϋ́	NV		na	Ϋ́	NA		na
n-Pentane	NA	NV		na	NA	1.80E+06		na
n-Hexane	NA	2.08E+02		na	Ą	5.28E+05		na
SVOCs								
n-nitrosodimethylamine	ΑA	1.23E-04		na	NA	2.50E+03		na
bis(2-chloroethyl)ether	NA	5.69E-03		na	NA	5.85E+04		na
phenol	NA	2.19E+03		na	NA	3.85E+04		na
2-chlorophenol	NA	1.83E+01		na	NA	5.25E+03		па
1,3-Dichlorobenzene	NA	3.29E+00		na	AN	3.61E+04		na
1,4-dichlorobenzene	ΝΑ	2.85E-01		na	ΑN	6.61E+05	·	па
1,2-dichlorobenzene	Š	2.09E+02		na	ΑN	3.01E+05		na
benzyl alcohol	Υ V	1.10E+03		na	ΑN	5.53E+04		na
bis(2-chloroisopropyl)ether	¥ V	1.79E-01		na	ΑN	6.99E+04		na

Table D-5: Comparison of Modeled Air Concentrations with Health-Based Values - 300-meter location

		Cartridge	e, 5.56-mm	Tun	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	С _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (µg/m³)	Cacute/ ATV	> 12
2-methylphenol	NA	1.83E+02		na	Ϋ́	ΑN		na
hexachloroethane	AA	4.47E-01		na	ΑA	2.90E+04		па
n-nitroso-di-n-propylamine	NA	8.94E-04		na	ΑA	2.00E+02		na
4-methylphenol	NA	1.83E+01		na	Ν	NA		na
nitrobenzene	NA	2.09E+00		na	NA	1.51E+04		na
isophorone	NA	6.59E+00		na	NA	2.83E+04		na
2-nitrophenol	NA	NV		na	NA	NA		na
2,4-dimethylphenol	NA	7.30E+01		na	NA	NA		na
bis(2-chloroethoxy)methane	ΑN	N/		na	NA	NA		na
2,4-dichlorophenol	NA NA	1.10E+01		na	NA	3.00E+04		na
1,2,4-trichlorobenzene	Υ V	2.08E+02		na	NA	3.71E+04		na
naphthalene	1.15E-03	3.13E+00	3.67E-04	no	2.79E-02	7.86E+04	3.55E-07	92
4-chloroaniline	ΝΑ	1.46E+01		na	NA	3.00E+04		па
hexachlorobutadiene	ΑN	8.03E-02		na	NA	3.21E+04		na
4-chloro-3-methylphenol	Ϋ́	N		na	NA	2.00E+04		na
2-methylnaphthalene	ΑN	7.30E+01		na	ΑA	2.00E+04		na
hexachlorocyclopentadiene	ΑN	7.30E-02		na	NA	2.23E+02		na
2,4,6-trichlorophenol	ΑN	6.20E-01		na	ΑA	3.00E+04		na
2,4,5-trichlorophenol	NA	3.65E+02		na	ΑA	3.00E+04		na
2-chloronaphthalene	NA V	2.92E+02		na	Ϋ́	6.00E+02		na
2-nitroaniline	ΝΑ	2.08E-01		na	ΑN	NA NA		na
Acenaphthylene	NA	N		na	Ϋ́	2.00E+02		na
dimethylphthalate	ΥN	3.65E+04		na	NA	1.50E+04		na
2,6-dinitrotoluene	ΑN	3.65E+00		na	NA	6.00E+02		na
acenaphthene	ΑN	2.19E+02		na	NA	1.25E+03		na
3-nitroaniline	NA	NV		na	NA	NA		na
2,4-dinitrophenol	NA	7.30E+00		na	NA	7.50E+03		na
dibenzofuran	Ϋ́	1.46E+01		na	NA	NA		na
2,4-dinitrotoluene	Ϋ́	7.30E+00		na	NA NA	6.00E+02		na
4-nitrophenol	ΑN	2.92E+01		Па	AA	3.00E+04		na
Fluorene	ΑN	1.46E+02		na	A'A	7.50E+04		na
4-chlorophenyl-phenylether	N A	>N		na	A A	NA		na

Table D-5: Comparison of Modeled Air Concentrations with Health-Based Values - 300-meter location

	S S S S S S S S S S S S S S S S S S S	C _{chronic} / HBSL 6.19E-05	7	Cacute NA	Acute Toxicity Value (µg/m³) 1.50E+04 9.00E+03 5.00E+02 NA 7.50E+01 1.50E+03 2.00E+03 6.00E+03 1.50E+04 3.00E+04	Cacute/ ATV	2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1
		6.19E-05		NA NA NA NA NA NA NA NA NA NA NA NA NA N	1.50E+04 9.00E+03 5.00E+02 NA 7.50E+01 1.50E+03 6.00E+03 6.00E+03 1.50E+04 3.00E+04	3.67E-05	B
		6.19E-05		NA NA NA NA NA NA NA NA NA NA NA NA NA N	9.00E+03 5.00E+02 NA NA 7.50E+01 1.50E+03 2.00E+03 6.00E+03 1.50E+03 3.00E+01	3.67E-05	2
		6.19E-05	E E E E E E E E	NA NA NA NA NA NA NA NA NA NA NA NA NA N	5.00E+02 NA NA 7.50E+01 1.50E+03 6.00E+03 1.50E+04 3.00E+01	3.67E-05	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
		6.19E-05	B B B B B B B B B	NA NA NA NA NA S.50E-01	NA NA 7.50E+01 1.50E+03 2.00E+03 6.00E+03 1.50E+04 3.00E+01	3.67E-05	
		6.19E-05	B B B B B B B	NA NA NA NA NA NA NA NA	7.50E+01 1.50E+03 2.00E+03 6.00E+03 1.50E+04 3.00E+01	3.67E-05	
		6.19E-05	B B B B B	NA NA NA S.50E-01	7.50E+01 1.50E+03 2.00E+03 6.00E+04 1.50E+04 3.00E+01	3.67E-05	na na na na na na na na
		6.19E-05	E E E E E	NA NA 5.50E-01	1.50E+03 2.00E+03 6.00E+03 1.50E+04 3.00E+01	3.67E-05	n n n n n n n n
		6.19E-05	E E C E	NA NA 5.50E-01 NA	2.00E+03 6.00E+03 1.50E+04 3.00E+01	3.67E-05	na no na
		6.19E-05	E 5 E	NA 5.50E-01 NA	6.00E+03 1.50E+04 3.00E+01	3.67E-05	na na
		6.19E-05	2 2	5.50E-01 NA	1.50E+04 3.00E+01	3.67E-05	na na
			a	NA NA	3.00E+01		na
			1				
	IA 1.10E+02		na	Y V	1.50E+04		a
			na	NA	5.00E+05		na
			na	NA	6.00E+02		na
	IA 8.58E-01		na	NA	2.00E+02		na
	E-02 4.47E-01	7.09E-02	ou	1.80E+00	1.00E+04	1.80E-04	2
	IA 7.30E+01		na	ΑĀ	1.50E+05		ā
	1A 8.58E-03		na	¥	NA		g
			na	ΑN			Б
			па	ΑN	7.50E+03		g
	8		na	NA W	NA		па
	8.5		g	¥ _N	3.00E+04		na
	>N Y		ā	¥	3.00E+04		g
	3.1	2.89E-04	9	2.20E-02	7.86E+04	2.80E-07	2
	3E-05 NV		na	NA	2.00E+02		g
	5E-06 2.19E+02	2.76E-08	no	NA	1.25E+03		na
fluorene 2.27E-05	7E-05 1.46E+02	1.55E-07	DO.	5.51E-04	7.50E+04	7.35E-09	2
phenanthrene 2.50E-05)E-05 NV		na	6.07E-04	2.00E+03	3.03E-07	2
	3E-06 1.10E+03	4.32E-09	2	1.15E-04	6.00E+03	1.92E-08	2
fluoranthene 2.84E-05		1.95E-07	5	6.91E-04	3.00E+01	2.30E-05	2
pyrene 7.75E-05	5E-05 1.10E+02	7.08E-07	2	1.89E-03	1.50E+04	1.26E-07	2

Table D-5: Comparison of Modeled Air Concentrations with Health-Based Values - 300-meter location

		Cartridge	, 5.56-mn	n Tur DODI	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	Cacute/ ATV	> 1?
benzo(a)anthracene	6.40E-06	8.58E-03	7.47E-04	20	3.63E-04	6.00E+02	6.06E-07	no
chrysene	7.49E-06	8.58E-01	8.73E-06	on	4.25E-04	2.00E+02	2.13E-06	2
benzo(b)fluoranthene	8.68E-06	8.58E-03	1.01E-03	ou	1.23E-04	NA		2 2
benzo(k)fluoranthene	4.74E-06	8.58E-02	5.53E-05	92	6.73E-05	NA A		2 2
Benzo(e)pyrene	2.36E-05	N<		па	1.44E-04	A N		2 2
benzo(a)pyrene	8.68E-06	2.02E-03	4.30E-03	2	4.93E-04	7.50E+03	6.57E-08	2 2
indeno(1,2,3-cd)pyrene	7.45E-06	8.58E-03	8.69E-04	2	1.06E-04	NA		E
dibenz(a,h)anthracene	1.02E-06	8.58E-04	1.19E-03	OL	5.79E-05	3.00E+04	1.93E-09	2
benzo(g,h,i)perylene	7.43E-05	N		na	1.81E-03	3.00E+04	6.03E-08	2
Dioxins and Furans								
2378-Tetrachlorodibenzo-p-dioxin	1.64E-11	4.17E-08	3.92E-04	2	9.29E-10	3.50E+00	2.65E-10	2
12378-Pentachlorodibenzo-p-dioxin	NA	N		na	AN	2.50E+00		2 2
123478-Hexachlorodibenzo-p-dioxin	NA	NV		na	AN	NA		i c
123678-Hexachlorodibenzo-p-dioxin	Ϋ́	NV		na	A'N	1.50E+01		na
123789-Hexachlorodibenzo-p-dioxin	ΝΑ	1.38E-06		na	Ϋ́	AN		pa
1234678-Heptachlorodibenzo-p-dioxin	1.69E-10	N		Б	1.03E-09	AN		na
Octachlorodibenzo(p)dioxin	1.18E-09	N		na	2.88E-08	1.50E+02	1.92E-10	2
2378-Tetrachlorodibenzo-p-furan	Ϋ́	NV		na	Ϋ́	2.00E+00		na
12378-Pentachlorodibenzo-p-furan	ΑN	N		na	Ϋ́	NA		na E
23478-Pentachlorodibenzo-o-furan	Υ _A	N<		na	NA	7.50E-02		na
1234/8-Hexachlorodibenzo-p-furan	7.11E-12	N/		па	1.73E-10	7.50E+00	2.31E-11	92
1230/8-Hexachlorodibenzo-p-turan	₹ Z	N		na	Ϋ́	2.50E+00		na
123789-Hexachiorodibenzo-p-furan	δ Z	\ \ \		na	NA	NA		na
234678-Hexachlorodibenzo-p-furan		2		na	NA	1.50E+00		пa
1234678-Heptachlorodibenzo-p-furan	3.82E-11	N		na	2.32E-10	AN		na Eu
1234789-Heptachlorodibenzo-p-furan	NA	NV		na	NA	NA		na Eu
Octachlorodibenzofuran	1.95E-11	N		na	4.75E-10	3.00E+02	1.58E-12	92
Energetics								
Nitrobenzene	NA V	2.09E+00		ä	A'A	1.51E+04		na
2-Nitrotoluene	NA	3.65E+01		na	AA	NA A		na
3-Nitrotoluene	AN A	3.65E+01		na	NA	AN		na
4-Nitrotoluene	NA NA	3.65E+01		Б	NA	3.37E+04		na

Table D-5: Comparison of Modeled Air Concentrations with Health-Based Values - 300-meter location

		Cartridge	, 5.56-mn	Tun DODIC	n Tungsten Ba DODIC: A059	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	2)	
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	C _{acute} / ATV	> 1?
Nitroalvoerine	Ą	4.47E-01		па	AN	ΑN		na
1 3-Dinitrobenzene	Ϋ́	3.65E-01		na	ΑN	3.00E+03		na
2 6-Dinitrotoluene	Ϋ́	3.65E+00		na	NA	6.00E+02		na
2.4-Dinitrotoluene	¥	7.30E+00		na	NA	6.00E+02		na
1,3,5-Trinitrobenzene	Ϋ́	1.10E+02		na	Ϋ́	3.00E+04		na
2,4,6-Trinitrotoluene	Ϋ́	2.09E-01		na	Y V	2.50E+04		na
RDX	¥	5.69E-02		na	NA	A'A		Б
4-Amino-2,6-Dinitrotoluene	¥	NV		na	NA	NA		na
2-Amino-2,6-Dinitrotoluene	¥	NV		na	NA NA	1.50E+04		na
Tetryl	ΑN	3.65E+01		na	¥	NA		па
HMX	¥	1.83E+02		na	NA	NA		na
Pentaerythritoltetranitrate	¥	N		na	NA	5.00E+01		пa
Dibutyl Phthalate	Ϋ́	3.65E+02		na	ž	1.50E+04		па
Dioctyl Phthalate	Ϋ́	4.47E-01		na	¥	1.00E+04		па
Diphenylamine	Ϋ́	9.13E+01		na	¥	3.00E+04		na

Footnotes:

NA: Not applicable because compound was not detected.

na: Not available because health-based sceening value is not available or not applicable if compound was not detected.

NV: No value available.

C_{chronic}: Chronic time-averaged concentration

HBSL: Chronic health-based screening level

Cacute: acute concentration

ATV: Acute toxicity value

Table D-6: Comparison of Modeled Air Concentrations with Health-Based Values: Total Petroleum Hydrocarbons - 300-meter location

	Cartrid	ge, 5.56-mm Tung DODIC	Cartridge, 5.56-mm Tungsten Ball, M855 (M16A2) DODIC: A059	M16A2)
Compound	C _{chronic} (µg/m³)	С _{chronic} (µg/m³)	C _{chronic} (µg/m³)	C _{chronic} (µg/m³)
	Aliphatic:C<=8	Aliphatic:C>8	Aromatic:C<=8	Aromatic:C>8
Benzene	ΑN	NA	4.99E-02	NA
Heptane	6.40E-06	NA	NA	AN
Toluene	NA	AN	2.27E-03	NA
Styrene	NA	NA	ΑΝ	8.08E-04
Propylene	8.55E-03	NA	AN	NA
naphthalene	ĄN	AN	AN	1.15E-03
naphthalene	NA	AN	ΑĀ	9.05E-04
acenaphthylene	ΑN	ΑΝ	ΑN	4.56E-05
Acenaphthene	ΑΝ	NA	NA	6.05E-06
fluorene	AN	AN	NA	2.27E-05
phenanthrene	NA	NA	NA	2.50E-05
anthracene	AN	NA	NA	4.73E-06
fluoranthene	NA	NA	NA	2.84E-05
Total (µg/m³)	8.56E-03	0.00E+00	5.22E-02	2.99E-03
Derived Health-Based Screening Level	1.92E+04	1.04E+03	4.17E+02	2.09E+02
C _{chronic} /HBSL	4.46E-07	0.00E+00	1.25E-04	1.43E-05
>19	no	ou	no	ou
Footnotes:				
>1? = Is the ratio greater than one?				
NA = Not Applicable because compound was not detected				
C _{chronic} = chronic averaged air Concentration				
HBSL = Health-Based Screening Level				

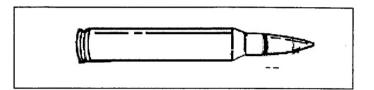
APPENDIX E FACT SHEET SUBMITTED TO AEC

U.S. Army Environmental Center Training Munitions Fact Sheet

M855 5.56-mm Tungsten Ball Cartridge

Department of Defense Identification Code: A059

Breathing air emissions from the M855 5.56-mm Tungsten Ball Cartridge will not impact the health of residents who live as close as 300 meters (984 feet) from the firing location.



To be fully prepared to protect our country, U.S. soldiers must train with many different weapons and munitions, including the M855 5.56-mm Tungsten Ball Cartridge. This training is important because it helps prepare our soldiers for a variety of combat situations. While the Army recognizes the value of such comprehensive training on our installations, we also work hard to ensure the safety and health of surrounding communities.

WILL BREATHING AIR EMISSIONS FROM THE M855 5.56-MM TUNGSTEN BALL CARTRIDGE AFFECT MY HEALTH?

To answer this question, the U.S. Army tested the air emissions that are released when the Tungsten M855 is fired. The information gathered during these tests was then analyzed to determine if there would be a potential for health effects from inhalation to residents who live near training areas. Study results, generated using conservative methods, showed that offsite residents breathing air as close as 300 meters (984 feet or about the length of three football fields) from the firing location are safe from these emissions. If offsite residents are located less than 300 meters from the firing locations, a more site-specific evaluation would be necessary. It should be noted that at most locations, training areas are at least 1,000 meters (over half a mile) away from populated areas and the distance to firing locations may be even farther.

HOW WAS THE STUDY CONDUCTED?

To gather data for this study, the Tungsten M855 was fired from the M16A2 rifle in a test chamber. The air in the chamber was then tested to identify the types and amounts of substances released. About 300 different substances were looked for during this part of the study.

This information was then used in an U.S. Environmental Protection Agency (USEPA) approved air model (a computer program that allows estimation of air concentrations) to determine the amount of each substance to which someone

living near a training site might be exposed. Downwind concentrations were estimated based on a typical use scenario for the Tungsten M855 during training exercises. Since this study did not look at any one specific training area, the assumptions used in the model would, in most cases, predict higher downwind air concentrations than those expected at an actual training site.

These estimated air concentrations were then compared to screening levels established by the USEPA and other federal agencies. If the air concentrations are less than these screening levels, they are considered safe for the general population, including sensitive people such as the sick, elderly, and children.

WHAT ARE THE STUDY LIMITATIONS?

Many steps were taken to ensure that the results of this study are protective of residents who live near training facilities. However, as with any study, this study has limitations. For example, the study does not consider exposure to other types of munitions that could also be used during the same training event. Due to these limitations, conservative model conditions were used to ensure the protection of public health from breathing Tungsten M855 air emissions.

WHAT EXACTLY IS THE M855 5.56-MM TUNGSTEN BALL CARTRIDGE?

The Tungsten M855 is a type of ball ammunition used on firing ranges during training. The Tungsten M855 is a variation of the original M855 and they differ in their bullet composition. The original M855 bullet consists of a copper alloy jacket with a steel penetrator and a lead-antimony slug whereas the Tungsten M855 bullet consists of a copper alloy jacket with tungsten-tin or tungsten-nylon. The Tungsten M855 was developed to mitigate lead contamination problems on test and training ranges while maintaining the combat effectiveness of the earlier version. Both versions of the M855 cartridge are about the length of a man's thumb and can be identified by their green tips.

WHERE CAN I GET MORE INFORMATION?

For more information on the Tungsten M855 or other military munitions, please call the Army Environmental Hotline at 1-800-USA-3845, visit our Web site at www.aec.army.mil, or e-mail t2hotline@aec.apgea.army.mil.